REPORT OF

GEOTECHNICAL INVESTIGATION
NORTH LAKE MECHANT
LANDBRIDGE RESTORATION PROJECT (TE-44)
TERREBONNE PARISH, LOUISIANA

FOR

ENGINEER

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

AND

AGENCY

LOUISIANA DEPARTMENT OF
NATURAL RESOURCES
BATON ROUGE, LOUISIANA

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October 31, 2002

C-K Associates, Inc.
17170 Perkins Road
Baton Rouge, Louisiana 70810

Attn: Mr. Patrick B. Broderick, P.E.
Engineering Manager

Re: Geotechnical Investigation - Revised
North Lake Mechant
Landbridge Restoration Project (TE-44)
Terrebonne Parish, Louisiana
STE File: 02-1073

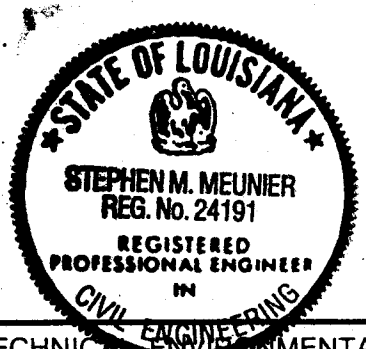
Dear Mr. Broderick:

Soil Testing Engineers, Inc. (STE) has completed the geotechnical investigation for this project and is pleased to submit the findings of the investigation together with the resulting evaluations and recommendations. Details are presented in the attached report.

Should you have any questions concerning this report, please contact this office. We appreciate the opportunity to serve you on this project, and look forward to working with you again in the future.

Sincerely,
Soil Testing Engineers, Inc.

Steve M. Meunier, P.E.
Senior Engineer



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Chief Engineer

REPORT OF
GEOTECHNICAL INVESTIGATION
NORTH LAKE MECHANT
LANDBRIDGE RESTORATION PROJECT (TE-44)
TERREBONNE PARISH, LOUISIANA

The findings of this investigation, together with the analyses and conclusions based on them, are discussed below. The field and laboratory investigations are described in Appendix A.

1.0 INTRODUCTION

1.1 General

The North Lake Mechant Landbridge Restoration Project (TE-44) consists of reinforcing a natural landbridge located along the northern rim of Lake Mechant, in Terrebonne Parish, Louisiana. The approximate coordinates of the center of the project area is latitude 29^0 19' 07" N and longitude 90^0 57' 40" W . The soil borings drilled for this project are located as shown on Figure 1. Figures 2 and 3 indicate the project features and the Control Sites used for the cross section information. The North Lake Mechant Landbridge Restoration Project (TE-44) will serve to prevent enlargement of the lake caused by erosion. This will be accomplished by using marsh creation, shoreline protection, and water control structures. The scope of services consists of geotechnical analyses of the in-situ soil in the project area to determine the soil quality for dredge and fill operations and the ability of the underlying foundation soils to support the proposed water control structures. The systems currently envisioned by the Louisiana Department of Natural Resources are

- Steel Sheet Pile Plugs;
- Canal Rip-Rap Plug;
- Renovation of Existing Weir;
- Earthen Plugs/Containment Dikes
- Armored Earthen Plugs
- Rock Dike Shoreline Protection, and
- Dredge Borrow/Fill Areas.

1.2 Scope of Work

STE's scope of work consisted of the following items:

- drill 17 soil borings (14 to the 25-foot depth and 3 to the 60-foot depth below mudline) at the LDNR furnished locations,
- perform laboratory tests to determine classification, strength, and compressibility characteristics for engineering analyses,
- perform slope stability and settlement analyses for the proposed rock dikes, earthen plugs/containment dikes and canal rip-rap plug structures,
- assess the existing weir condition and provide recommendations for repair, and
- perform analyses for the sheetpile plug structures, providing lengths and quantities for each site.

1.3 Limitations

The analyses and recommendations presented in this report are based on the results of the investigation, and the furnished information as provided by the Louisiana Department of Natural Resources. While it is not too likely that conditions will differ greatly from those observed in the borings, it is always possible that variations can occur between or away from the borehole locations. If it becomes apparent during construction that subsurface conditions differing significantly from those discussed in Section 2 are being encountered, this office should be notified at once so that their effects can be determined and any remedial measures necessary prescribed. Also, should the nature of the project change considerably, these recommendations may have to be re-evaluated.

This report has been prepared for the exclusive use of the Department of Natural Resources and their consultants for the purpose of designing the proposed North Lake Mechant Landbridge Restoration Project as generally described in Section 1.1. The recommendations provided are site specific and are not intended for use at any other site.

1.4 Report Organization

Based on the scope of work stated in Section 1.2, this report is separated into four sections. Section 1 provides an introduction to this project and describes the scope of work. Section 2 discusses the site, geology, and soil conditions. The results of the engineering analyses are presented in Section 3.

2.0 GEOLOGICAL AND SOIL CONDITIONS

2.1 Site and Geology Conditions

The site is along the northern rim of Lake Mechant, in Terrebonne Parish, Louisiana. The approximate coordinates of the center of the project area is latitude 29^0 19' 07" N and longitude 90^0 57' 40" W . The entire project area is a marshland with site elevations ranging from -12 feet to +2 feet NAVD 88. The limited available geologic information indicates the site is underlain by weak and highly compressible Delta Plain, Marsh deposits of Holocene Age (normally consolidated) to about Elev. - 500 feet (+/-) NAVD 88. More competent Pleistocene materials begin at about that depth.

2.2 Soil Conditions

2.2.1 General Information. LDNR specified 17 soil borings for this project. Borings B-6, B-7 and B-8 were drilled to a depth of 60 feet below the mudline for the determination of sheetpile embedment lengths. The remainder of the borings were drilled to the 25 foot depth below mudline. The boring locations were furnished by LDNR with latitude and longitude coordinates and physically located in the field by C-K Associates and STE personnel. The latitude and longitude coordinates for each boring are shown on each boring log and are located within the project area as shown on Figure 1. All depths referenced at each boring log are from the mudline encountered at each location. A profile of all of the boring logs is shown on Figures 4-6, indicating the top of boring elevations.

2.2.2 Soil Conditions at Sheetpile Plug Structures. The soil conditions encountered at the location of boring B-6 consist of an extremely soft peat layer with organic material and wood to a depth of 13 feet below the mudline, which was measured at an Elevation of -0.5 NAVD 88. These deposits were underlain by a layer of very soft organic clay with peat and wood lenses to a depth of 28 feet, followed by a layer of very soft clayey silt with fine sand to a depth of 32 feet. A layer of soft organic clay followed to the 37 foot depth. These deposits were in turn, underlain by a layer of very soft clay with sand seams and organics to a depth of 43 feet, followed by very soft to soft organic clays to the termination depth of the boring at 60 feet.

The soil conditions encountered at boring B-7 consist of an extremely soft and highly compressible layer of peat to a depth of 4 feet below the mudline, which was measured at an Elevation of -0.5 NAVD 88. Underlying these deposits was a layer of extremely soft organic clay with silty sand seams to a depth of 8 feet, followed by very soft to soft layers of organic clay with silty sand seams to the termination depth of the boring at 60 feet.

The mudline at boring B-8 was encountered at Elevation -4.0 NAVD 88. The soil conditions at this location consist of an extremely soft layer of organic clay with sand seams to a depth of 4 feet, followed by a dense layer of silty sand with interbedded lenses of organic clay to a depth of 8 feet. These deposits were underlain by a layer of very soft organic clay with peat and sand to a depth of 37 feet, followed by a layer of soft silty clay with silty sand seams and layers to a depth of 52 feet. A layer of soft clay with silt seams followed to the termination depth of the boring at 60 feet.

2.2.3 Soil Conditions at Rock Dike Structures. The soil conditions encountered at boring location B-5 consist of an extremely soft peat layer to a depth of 6 feet below the mudline, which was measured at an Elevation of 0.5 NAVD 88. These deposits were underlain by a layer of very soft silty clay with sand seams and lenses to a depth of 12 feet, followed by layers of very loose to firm sandy silt with organic material to a depth of 22 feet. A layer of soft organic clay with silt traces was encountered to the termination depth of the boring at 25 feet.

The soil conditions encountered at boring B-10 consist of an extremely soft peat layer with organic material to a depth of 4 feet below the mudline, which was measured at Elevation -0.5 NAVD 88. Underlying these deposits were layers of very soft organic clay with sand seams, peat and organic material to a depth of 23 feet, followed by a soft clayey sand layer to the termination depth of the boring at 25 feet.

The mudline at boring B-15 was encountered at Elevation -1.0 NAVD 88. The soil conditions at this location consist of a very soft organic clay to a depth of 4 feet, followed by an extremely soft organic clay with silty sand seams to a depth of 6 feet. These deposits were underlain by a soft organic clay layer with silty sand seams to a depth of 13 feet. A soft silty clay layer with sand seams and organic material was then encountered to a depth of 17 feet, followed by a very soft layer of organic silty clay to a depth of 22 feet. A layer of medium stiff peat with clay and wood followed to the termination depth of the boring at 25 feet.

2.2.4 Soil Conditions at Rip-Rap Plug Structure. The soil conditions encountered at boring location B-12 consist of very soft sandy and silty clay layers with organic material and silty sand seams to a depth of 10 feet below the mudline, which was measured at an Elevation of -3.0 NAVD 88. These deposits were underlain by a soft clay with silt seams and sand layer to a depth of 14 feet, and were followed by a 1-foot thick layer of silty sand with clay. A layer of soft organic clay was then encountered to the completion depth of the borings at 25 feet.

2.2.5 Soil Conditions at the Existing Weir Structure. The soil conditions encountered at boring location B-11 consist of a layer of extremely soft organic clay with peat and sand to a depth of 4 feet below the mudline, which was measured at Elevation -4.0 NAVD 88. These deposits were underlain by a stratum of medium silty sand with a 2-foot thick interbedded layer of very soft silty clay to a depth of 12 feet, followed by a layer of very soft organic clay to a depth of 18 feet. A layer of soft peat with clay followed to the 22-foot depth. These deposits were then underlain by a layer of very soft organic clay with alternating silty sand seams to the termination depth of the boring at 25 feet.

2.2.6 Soil Conditions at the Earthen Plug Containment Areas. The soil conditions encountered at boring locations B-1 through B-4 and B-9 consist of extremely soft peats and organic clays to depths varying from 2 to 18 feet below the mudline, which varied in Elevation from -1.5 to 0.5 NAVD 88. These deposits were underlain by very soft to soft organic clays and clays with organic material and silty sand layers to the termination depth of the borings at 25 feet.

2.2.7 Soil Conditions at the Borrow Areas. The soil conditions encountered at boring location B-13 consist of extremely soft to soft organic clays with interbedded layers of clayey silts and sandy clays to the termination depth of the boring at 25 feet. The mudline was measured at an Elevation of -3.0 NAVD 88.

The soil conditions encountered at boring location B-14 consist of a very loose clayey sand layer with shell and gravel to a depth of 8 feet below the mudline, which was measured at an Elevation of -5.0 NAVD 88. These deposits were underlain by a layer of extremely soft to soft organic clay with peat and wood to the termination depth of the boring at 25 feet.

The mudline at boring location B-16 was measured at Elevation -3.5 NAVD 88. A layer of extremely soft organic clay with wood, shell and silt was encountered to a depth of 2 feet, followed by a layer of extremely soft to soft organic clayey silt with shell and sand to the 12-foot depth. These deposits were underlain by a very soft to soft organic clay to the termination depth of the borings at 25 feet.

The soil conditions encountered at boring location B-17 consist of extremely soft silty clay to clayey silt with organic material to a depth of 4 feet below the mudline, which was measured at an Elevation of -3.0 NAVD 88. An extremely soft organic clay layer with silty sand seams and pockets followed to the 22-foot depth. These deposits were then underlain by a very soft organic clay layer to the termination depth of the boring at 25 feet.

2.2.8 Shear Strength and Consolidation Characteristics. Twenty-one field vane tests were performed within the borings for this geotechnical investigation. The field vane tests were conducted

in general accordance with the method described in ASTM D 2573. The results from the vane shear tests were corrected for plasticity based on Bjerrum's study and rate-of-rotation (Das, 1990). The corrected values are provided in Table 1 and on each individual boring log.

The laboratory shear strength tests consist of unconsolidated-undrained triaxial tests and unconfined compression tests on cohesive soils. The results of the unconsolidated undrained triaxial tests are generally consistent with the those found from the field vane shear tests.

Fifteen consolidation tests were performed on selected soil samples to determine the compressibility characteristics of the underlying clay soils. The results of these tests are shown on the individual percent strain versus log pressure curves with plots of coefficient of consolidation, and the initial and final moisture contents.

3.0 ENGINEERING ANALYSES & ASSESSMENTS

3.1 General

Stability analyses of the rock sections, rip-rap plugs and the estimated settlement profiles are as shown on Figures 7 through 10. The results of the sheetpile analyses for the sheetpile plug structures are as shown on Figures 11 through 13. The cross-section and control information used for these analyses were obtained from a furnished ABMB Engineers, Inc. report entitled, State of Louisiana Department of Natural Resources Coastal Restoration Division North, Lake Mechant Landbridge Restoration Project (TE-44), Terrebonne Parish, Louisiana, dated June 21, 2002.

3.2 Structure Stabilities

Slope stability analyses were performed using XSTABL marketed by Interactive Software Designs, Inc. This program evolved from PCSTABL by Purdue University. The program is capable of searching for the minimum safety factor with an easy to use interface. The Bishop method of analysis was used for this project. The accepted measure of a slope's stability is its "safety factor". This is the ratio of the forces or moments tending to prevent failure (soil strength, primarily) to those causing failure (soil and surcharge weights plus seepage forces). The analyses determine these forces and their ratios (safety factors) for many trial failure surfaces. The surface yielding the minimum safety factor governs the slope stability. Typical acceptable safety factors common in practice are:

Low Water Condition:	1.3 - 1.5
Rapid Drawdown Condition:	1.0 - 1.1

The rapid drawdown case is not applicable for this project due to the nature of the tidal conditions at the proposed structures. Due to the extremely soft soils at this site, it is very difficult to achieve the normally accepted safety factor without geotextile reinforcement. Therefore, a minimum safety factor of 1.3 was used for structure stability assuming a layer of high strength geotextile fabric is placed beneath the earthen plugs, rock dikes and rip-rap plugs. The required tensile strengths of the geotextile fabric are as shown for each structure on Figures 11 through 13. As a minimum, it is recommended that Class 250 lb Rip-Rap be utilized for all rock structures, including armored

structures. Class 400 lb Rip-Rap should also be considered for use within the lower sections of the proposed Rip-Rap Plug at the Boring B-12 structure location. Using the USACE Shore Protection Manual, estimated damage levels for the rock structures using 3H:1V front slopes and 1.5H:1V back slopes is 20-30 percent and 40-50 percent, respectively for storm conditions. The storm conditions utilized for estimating the damage levels of these rock structures includes 1-foot above the MHW Elevation of +1.34 NAVD 88 and a maximum wave design height of 0.78 times the water depth.

3.3 Settlement Analyses

Settlement analyses were performed using VSTRESS originally developed by the Corps of Engineers and SETOFF as developed by Ensoft, Inc. These programs calculate one-dimensional settlement based on either Boussinesq or Westergaard stress distributions. The Boussinesq stress distribution was used for these analyses. For the soil types that had consolidation tests, actual consolidation curves were used in the calculations. Published correlations were also used to obtain consolidation indices using Atterberg Limits and moisture content values.

The results of the settlement analyses, as shown Figures 7 through 13, are based on the assumption that the earthen containment and rock dike/plug structures are placed on the existing ground surface. Staged construction will be required for all of these structures due to the extremely weak foundation soils encountered within the project area and the resulting high settlements estimated. Due to the large settlements anticipated, the actual settlements will be substantially greater as more rip-rap and embankment material are needed to bring the structures to the final design elevations. Without using a more refined method, we estimate that actual settlements may be as much as 80 to 100 percent more than the predicted settlement values. The structures may be initially constructed to the shown target elevations, and upon completion of the majority of the anticipated settlement, built up in sequential stages to the final design elevations.

The earthen and armored earthen containment areas should also be constructed using a high strength geotextile fabric beneath the embankment material. Minimum side slopes on the order of 4 Horizontal to 1Vertical should be used for the containment dikes. Long-term settlements are anticipated to be on the order of 1.5 to 2.5 feet, depending on the thickness of the underlying peat layers. These structures will also require staged construction, using the initial design elevations as the target elevations for the first stage. It is our understanding that the dredging process will require from 12 to 18 months of construction for this project. It is our recommendation that each containment area be constructed to the design elevations, then allowed to settle over a period of several months, then built-up to the design elevations near the end of the project construction period. This will allow at least one cycle of consolidation settlement to occur before placing material to the final design elevations. Average marsh elevations for boring locations B-1, B-2, B-3 and B-4 are on the order of 0.0, 0.0, 0.5 and 0.0 NAVD 88, respectively. Typical configurations planned for these structures are as shown in Figures 14 and 15.

We understand that a geotextile will be used as separation for the rock riprap material and the native soils. Based on the settlement estimates, the tensile strain will be more than 1% and will be near the typical allowable tensile strength (determined by method GRI GT7) of the geotextile material. In

addition, the size of the rock riprap will cause significant punching stresses. The combination of these two stresses may overstress some geotextile fabrics and should therefore, be carefully evaluated.

3.4 Sheetpile Plug Structures

The computer program CWALSHT developed by the USAE Waterways Experiment Station was employed for the analyses of the cantilevered sheetpile plug structures at Control Sites #24, #16 and #4. The results of these analyses are as indicated in Figures 11 through 13. Two load cases were considered in these analyses. The first case considered a typical non-breaking wave force of 1,000 lb/foot, applied at an Elevation of +2.34 NAVD 88, which includes 1-foot above MHW. This non-breaking wave force was calculated taking the mean water depth for the sheetpile structures. The second load case considered the complete siltation of one side of the sheetpile plug to an Elevation of +2.0 NAVD 88. A safety factor of 1.5 was applied to the passive pressures to determine the penetration requirements for the cantilevered sheet pile plug structures. The use of a safety factor of 1.5 will produce an unrealistic moment distribution along the wall and resulting in an unknown safety factor. Therefore, the maximum design moments were determined using service loads (factor of safety = 1.0). The penetration requirements were determined using a safety factor of 1.5 for the passive resistances; the maximum design moments were determined using service loads. The results of our analyses indicates that a minimum sheetpile section equivalent to a PDA-27, Grade 42 be utilized for all of the sections except for Control Site #4, which will require a PDA-27, Grade 50 section at the deepest point of the crossing.

Due to the deep layers of extremely soft and highly compressible peat soils underlying these sites, alternate rock structures are not recommended at these locations. The amount of geotextile reinforcement and rip-rap material needed for a rock alternate will most likely preclude this from consideration.

3.5 Site Assessment of Existing Weir at Control Site #10

The existing weir structure at Control Site #10, as indicated in Figure 16, is constructed of vertical and battered timber piling bents spaced at approximately 8 to 10 foot spacing. Actual details of the weir structure are unavailable at this time. The structure appears to span a cross section approximately 100 to 120 feet in width, with a minimum bottom elevation of -12.0 NAVD 88. Only a portion of the structure was visible during our field inspection. It is recommended that a more detailed inspection be performed of the structure by qualified diving personnel. Several of the rotten or broken piles may be easily replaced with new piling, along with new bolted connections at the top of the bents. Consideration should be given to replacing the broken elements in kind, provided the weir is constructed of timber lagging or steel sheetpiling. The worst portions of the visible parts of the structure appear to occur at the bulkhead ends. These should be entirely replaced and keyed into new earthen wingwalls. STE will be pleased to perform engineering analyses and provide recommendations for either repairs or replacement once inspection information becomes available.

3.6 Cut To Fill Ratio

It is our understanding that the borrow areas, as indicated in boring locations B-13, B-14, B-16 and B-17 will be dredged to a maximum depth of 12 feet. The earthen structures planned for this project will most likely be placed using either pumping techniques in conjunction with semi-compacted densities. In view of this, we estimate a cut-to-fill ratio varying from 2 to 2-1/2. The average cut-to-fill ratio is probably closer to 2, with 2-1/2 being recommended for estimating purposes.

NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-44)
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
TERREBONNE PARISH, LOUISIANA
TABLE 1

FIELD VANE SHEAR TESTS

Boring No.	Depth (feet)	Soil Type	Raw Readings (in-lbs)			Adjusted Readings (in-lbs)		Shear Strength (psf)		Sensitivity (dec.)	Remarks
			Tare	Peak	Remolded	Peak	Remolded	Peak	Remolded		
B-1	0-2	ExSo OH	0	75	35	86	40	48	22	2.1	PI=37; ω= 3 °/sec.
B-2	8-10	VSo CH	5	205	60	230	63	127	28	4.5	PI=38; ω= 3 °/sec.
B-3	0-2	ExSo Pt	5	55	20	58	17	25	7	3.3	PI=86; ω= 3 °/sec.
B-4	4-6	ExSo OH	10	70	30	69	23	39	13	3.0	PI=34; ω= 3 °/sec.
B-5	2-4	ExSo Pt	10	65	25	63	17	37	10	3.7	PI=30; ω= 3 °/sec.
B-6	8-10	ExSo Pt	0	55	20	63	23	30	11	2.8	PI=62; ω= 3 °/sec.
	20-21	VSo OH	5	250	55	282	58	104	21	4.9	PI=125; ω= 3 °/sec.
	30-31	VSo ML	25	280	80	293	63	195	42	4.6	PI=18; ω= 3 °/sec.
B-7	10-11	VSo OL	5	175	40	196	40	140	29	4.9	PI=13; ω= 3 °/sec.
	20-21	VSo OH	10	200	45	219	40	104	19	5.4	PI=62; ω= 3 °/sec.
	30-31	So OH	20	275	60	293	46	140	22	6.4	PI=62; ω= 3 °/sec.
B-8	10-11	VSo OH	10	225	65	247	63	114	29	3.9	PI=69; ω= 3 °/sec.
	30-31	VSo OH	15	260	55	282	46	170	28	6.1	PI=27; ω= 3 °/sec.

Sensitivity = Peak Strength/Remolded Strength
Adjusted Reading = (Raw-Tare)*1.15 (Wrench Calibration)
Shear Strength = 1.087 x Adjusted Reading (Vane Equation)
Soil Type Abbreviations:

ExSo	0< su < 99 psf
VSo	100< su < 249 psf
So	250< su < 499 psf
Med	500< su < 999 psf

Vane Shear Procedure: ASTM D 2573

NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-44)
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
TERREBONNE PARISH, LOUISIANA
TABLE 1 (Continued)

FIELD VANE SHEAR TESTS

Boring No.	Depth (feet)	Soil Type	Raw Readings (in-lbs)			Adjusted Readings (in-lbs)		Shear Strength (psf)		Sensitivity (dec.)	Remarks
			Tare	Peak	Remolded	Peak	Remolded	Peak	Remolded		
B-9	8-10	So OH	5	70	25	75	23	45	14	3.3	PI=28; ω= 3 °/sec.
B-10	4-6	VSo OH	10	80	50	81	46	44	25	1.8	PI=39; ω= 3 °/sec.
B-11	6-8	VSo CL	10	185	60	201	58	128	37	3.5	PI=22; ω= 3 °/sec.
B-12	6-8	VSo CL	5	155	25	173	23	136	18	7.5	PI=8; ω= 3 °/sec.
B-13	2-4	ExSo OL	5	105	45	115	46	63	25	2.5	PI=40; ω= 3 °/sec.
B-14	6-8	VLo CS	5	55	135	58	150	39	101	0.4	PI=17; ω= 3 °/sec.
B-15	4-6	ExSo OH	8	165	53	181	52	81	23	3.5	PI=74; ω= 3 °/sec.
B-16	0-2	ExSo OH	0	55	25	63	29	32	14	2.2	PI=54; ω= 3 °/sec.
B-17	0-2	ExSo CL	0	20	5	23	6	11	3	4.0	PI=67; ω= 3 °/sec.

Sensitivity = Peak Strength/Remolded Strength
Adjusted Reading = (Raw-Tare)*1.15 (Wrench Calibration)
Shear Strength = 1.087 x Adjusted Reading (Vane Equation)
Soil Type Abbreviations:

ExSo	0< su < 99 psf
VSo	100< su < 249 psf
So	250< su < 499 psf
Med	500< su < 999 psf

Vane Shear Procedure: ASTM D 2573

North Lake Mechant Landbridge Restoration Project (TE-44) Geotech Map

Terrebonne Parish, LA

LEGEND

- Dredge Borrow Areas
- Dredge Fill Areas
- Pipelines

Soil Borings

- 10 ft
- 25 ft
- 40 ft

Note: All features are graphical representations only and may not reflect true location or dimension.

N

0.25 0 0.25 0.5 Miles

FIGURE 1
STE Project 02-1073

North Lake Mechant Landbridge Restoration Project (TE-44) Geotech Map

Terrebonne Parish, LA

LEGEND

- Pipelines
- Vegetation
- Rock
- Dredge Borrow Areas
- Dredge Fill Areas
- Oyster Leases
- Oyster Seed Ground
- Control Sites
- Weir Repair

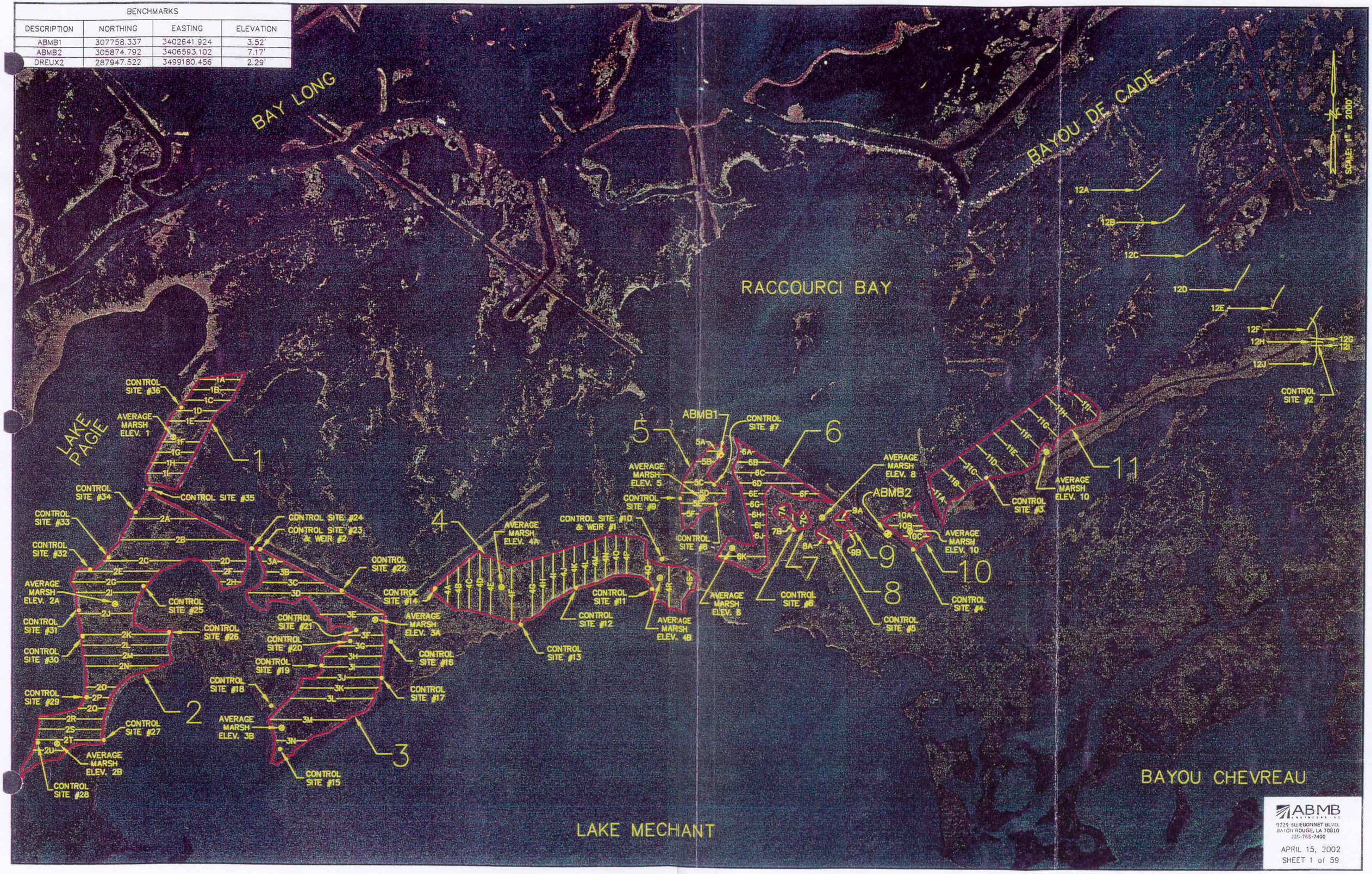
Note: All features are graphical representations only and may not reflect true location or dimension.

N

0.25 0 0.25 0.5 Miles

FIGURE 2
STE Project 02-1073

BENCHMARKS			
DESCRIPTION	NORTHING	EASTING	ELEVATION
ABMB1	307758.337	3402641.924	3.52'
ABMB2	305874.792	3406593.102	7.17'
DREUX2	287947.522	3499180.456	2.29'



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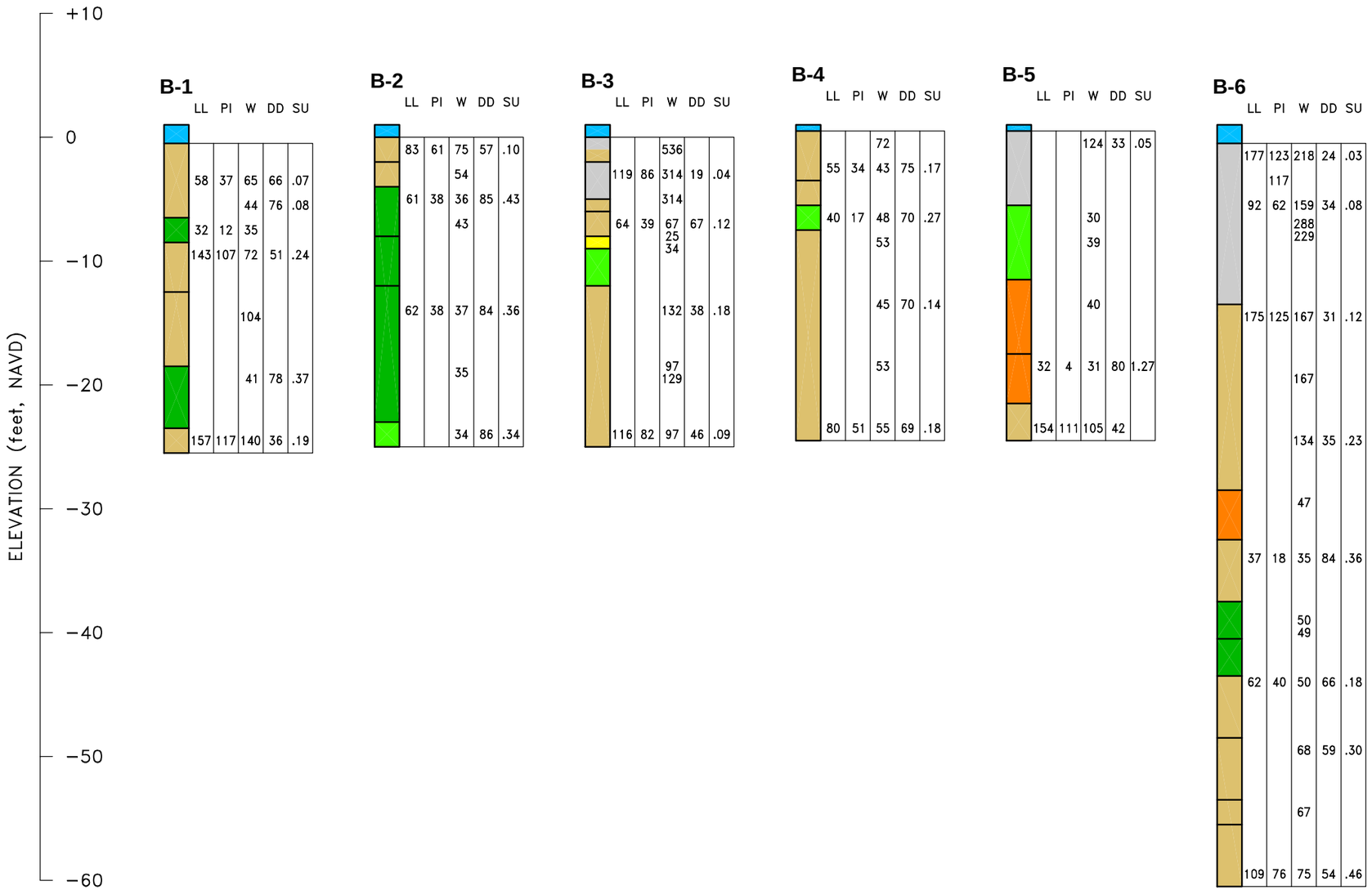
APRIL 15, 2002
SHEET 1 of 59

STE Project 02-1073

FIGURE 3

Nov 05, 2002 - 10:03am



SYMBOL	SOIL TYPE
	WATER
	PEAT (PT)
	ORGANIC CLAY (OH)
	CLAY (CH)
	SILTY CLAY (CL)
	SANDY SILT, CLAYEY SILT (ML)
	SILTY SAND (SM)

L E G E N D:

LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
W	WATER CONTENT (%)
DD	DRY DENSITY (pcf)
SU	UNDRAINED SHEAR STRENGTH (ksf)
(XX)	STD. PENETROMETER RESISTANCE (blows/foot)

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

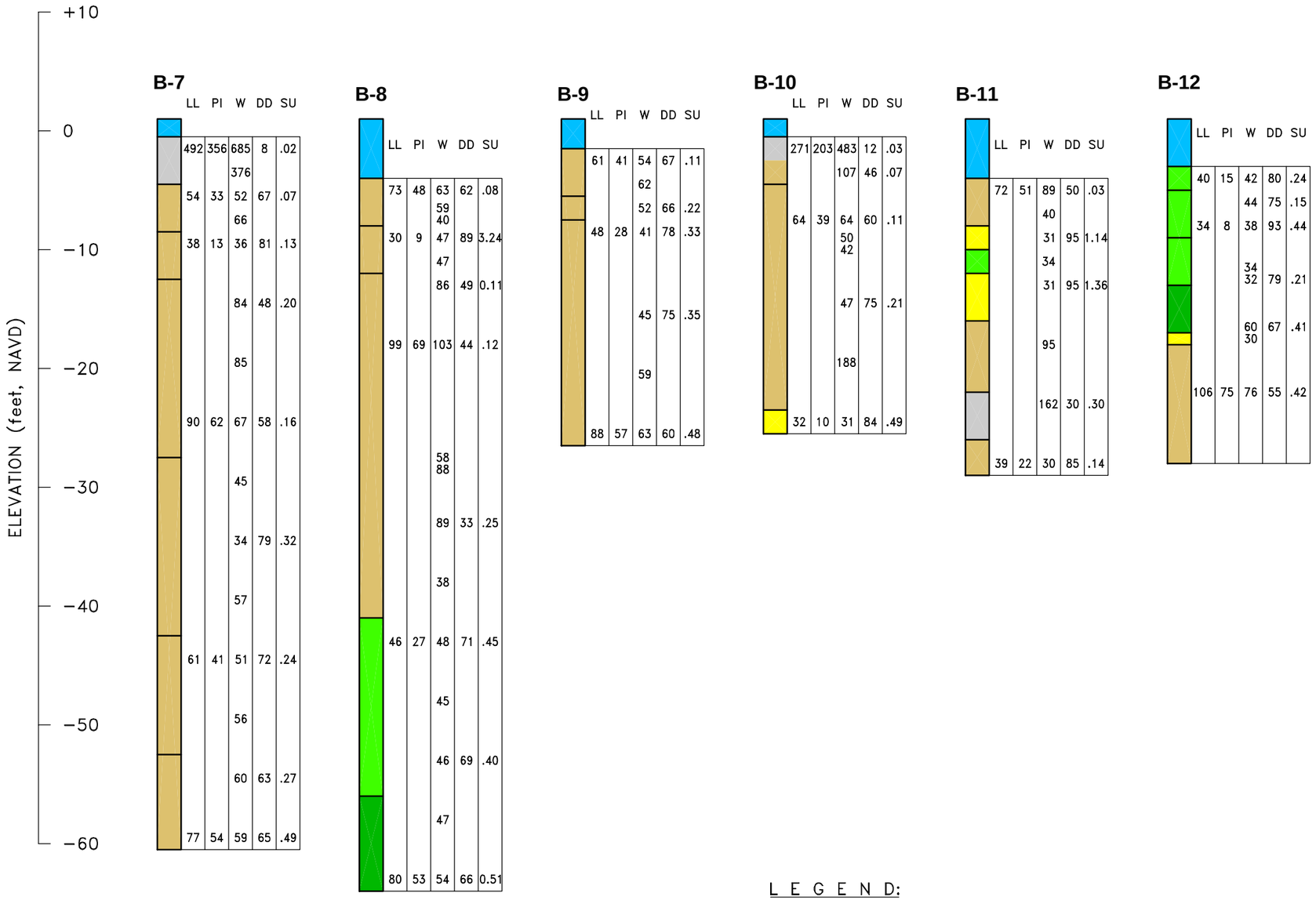
for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02-1073	9-24-02	4

Title:
SOIL BORING PROFILE

P:\2002\02-1073\CADD\021073-2 SOIL PROFILE B1-B6.DWG



SYMBOL	SOIL TYPE
	WATER
	PEAT (PT)
	ORGANIC CLAY (OH)
	CLAY (CH)
	SILTY CLAY (CL)
	SANDY SILT, CLAYEY SILT (ML)
	SILTY SAND (SM)

L E G E N D:

LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
W	WATER CONTENT (%)
DD	DRY DENSITY (pcf)
SU	UNDRAINED SHEAR STRENGTH (ksf)
(XX)	STD. PENETROMETER RESISTANCE (blows/foot)

LDNR
NORTH LAKE MECHANT
LANDBRIDGE RESTORATION
PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

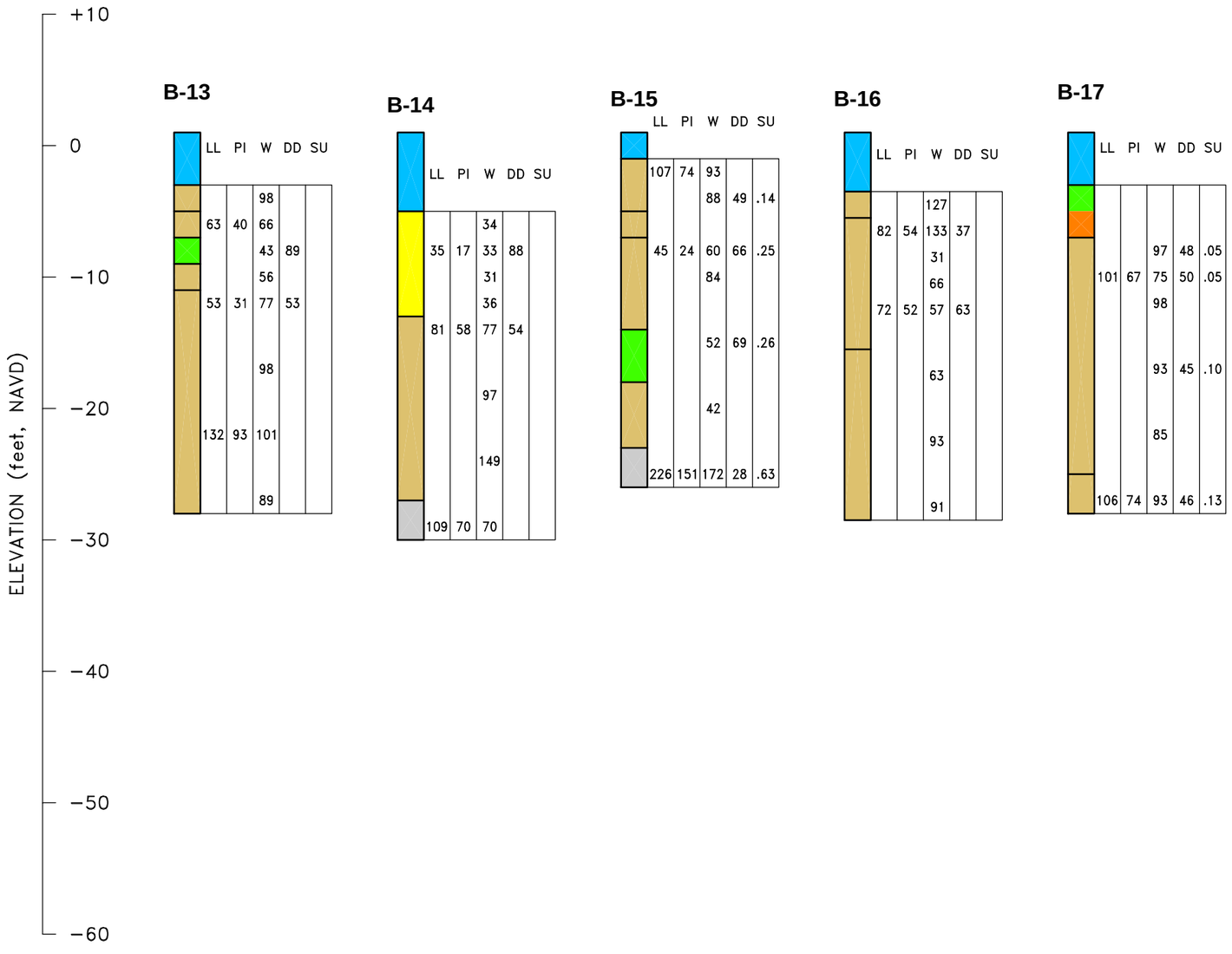
STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	5

Title:
SOIL BORING PROFILE

Nov 05, 2002 - 10:03am

P:\2002\02-1073\CADD\021073-2 SOIL PROFILE B7-B12.DWG



SYMBOL	SOIL TYPE
	WATER
	PEAT (PT)
	ORGANIC CLAY (OH)
	CLAY (CH)
	SILTY CLAY (CL)
	SANDY SILT, CLAYEY SILT (ML)
	SILTY SAND (SM)

L E G E N D:

LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
W	WATER CONTENT (%)
DD	DRY DENSITY (pcf)
SU	UNDRAINED SHEAR STRENGTH (ksf)
(XX)	STD. PENETROMETER RESISTANCE (blows/foot)

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TERREBONNE PARISH, LOUISIANA

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C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

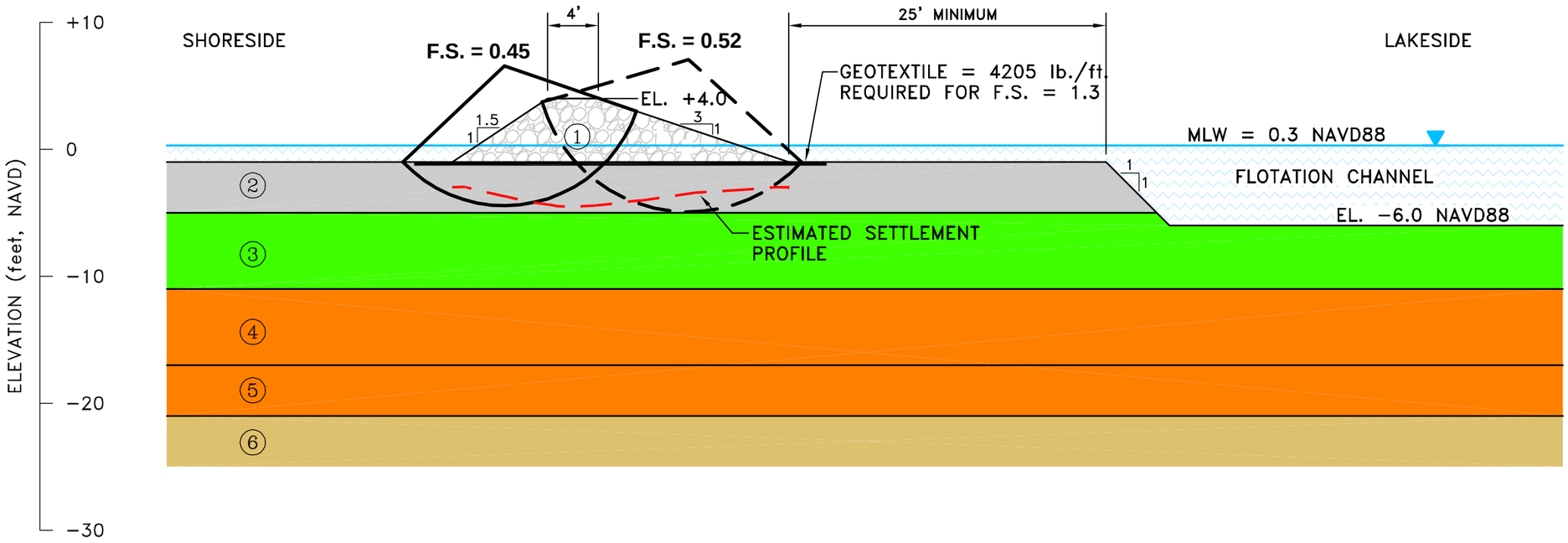
STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	6

Title:
SOIL BORING PROFILE

Nov 05, 2002 - 10:04am

P:\2002\02-1073\CADD\021073-4 SOIL PROFILE B3-B17.DWG



STRATUM NO.	USCS CLASS.	Cu (psf)	γ (pcf)	ϕ (degrees)
1	250# RIPRAP	0	135.0	45
2	PT	40	73.9	0
3	CL	188	100.0	0
4	ML	0	104.8	25
5	ML	0	104.8	25
6	OH	330	86.1	0

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TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

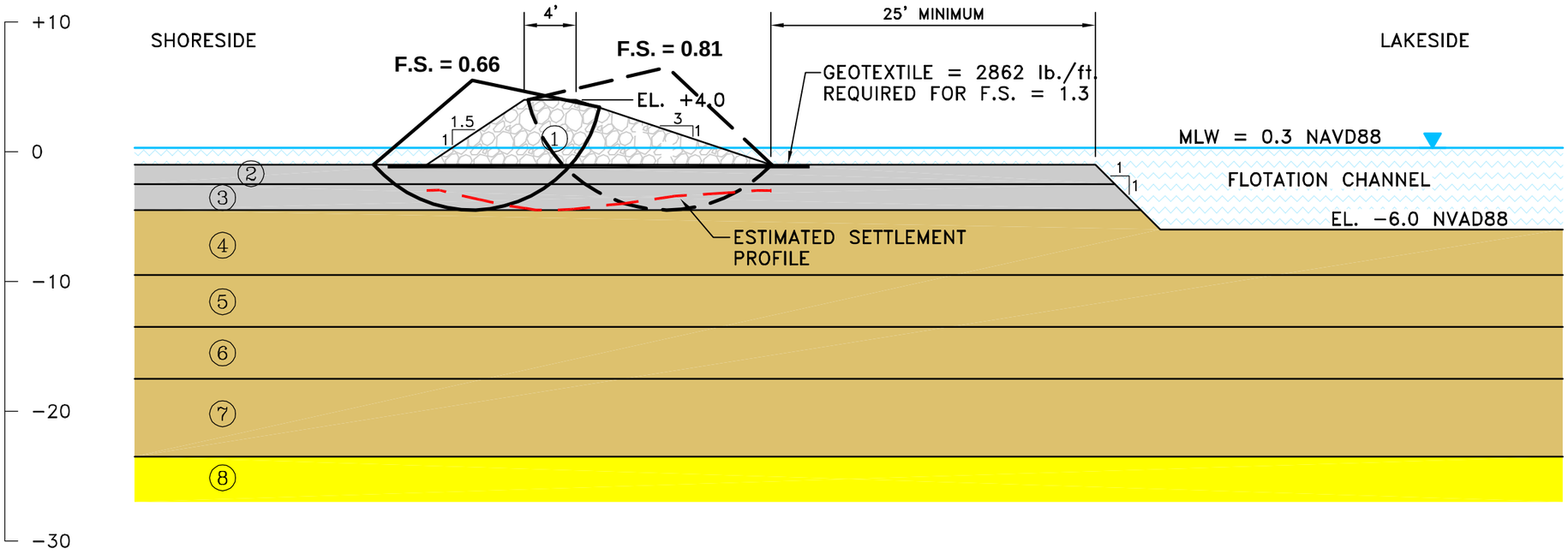
STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	7

Title: **STABILITY OF ROCK SECTION AT BORING B-5**

Nov 05, 2002 - 10:02am

P:\2002\02-1073\CADD\021073 STABILITY2.DWG



STRATUM NO.	USCS CLASS.	Cu (psf)	γ (pcf)	ø (degrees)
1	250# RIPRAP	0	135.0	45
2	PT	30	70.0	0
3	PT	70	95.2	0
4	OH	110	98.4	0
5	OH	125	98.4	0
6	OH	210	110.2	0
7	OH	165	90.0	0
8	SC	490	110.0	0

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

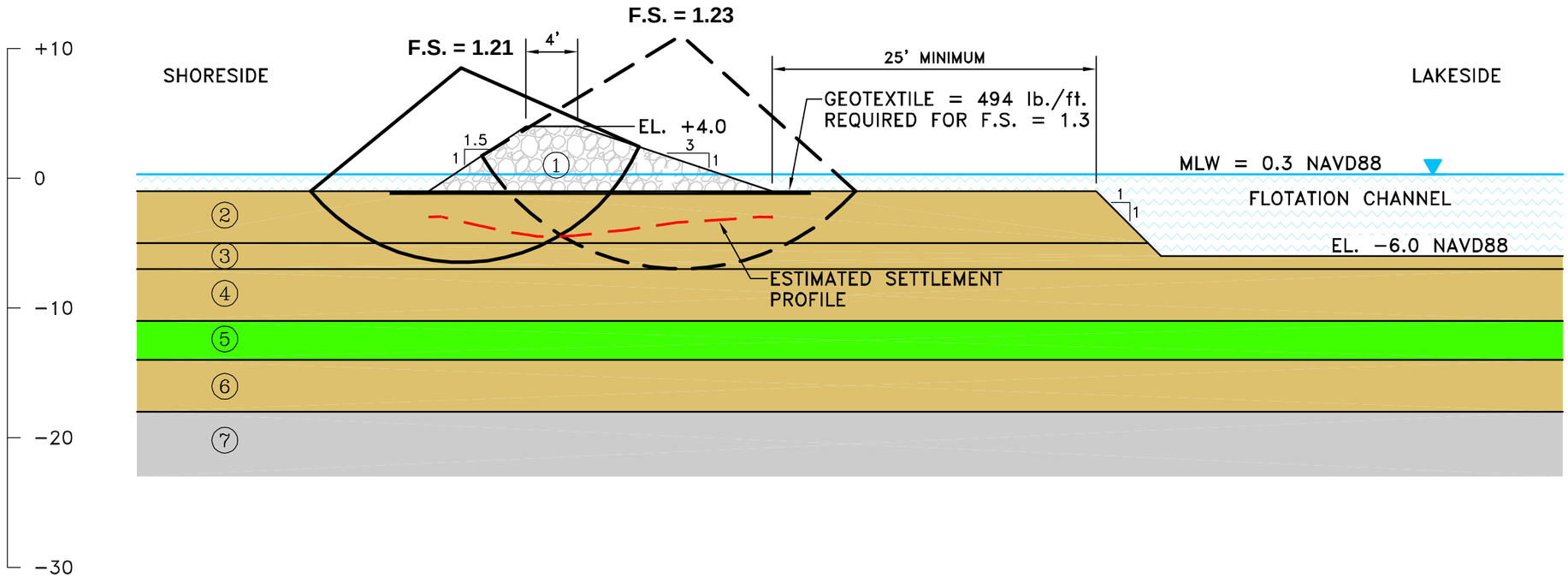
STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	8

Title: **STABILITY OF ROCK SECTION AT BORING B-10**

Nov 05, 2002 - 10:02am

P:\2002\02-1073\CADD\021073 STABILITY3.DWG



STRATUM NO.	USCS CLASS.	Cu (psf)	γ (pcf)	ϕ (degrees)
1	250# RIPRAP	0	135.0	45
2	OH	140	92.1	0
3	OH	80	92.0	0
4	OL	250	105.6	0
5	CL	260	105.0	0
6	CH	167	100.0	0
7	PT	630	76.2	0

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NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

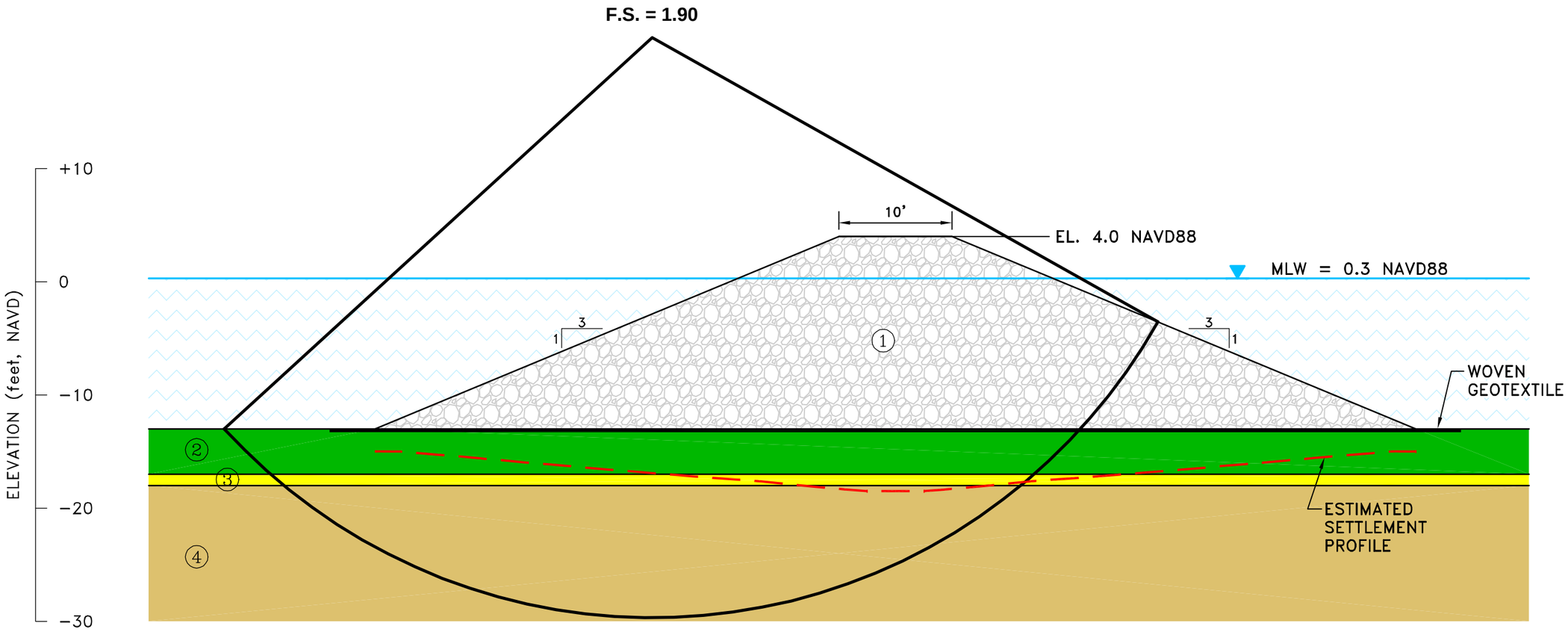
STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	9

Title: **STABILITY OF ROCK SECTION AT BORING B-15**

Nov 05, 2002 - 10:01am

P:\2002\02-1073\CADD\021073 STABILITY1.DWG



STRATUM NO.	USCS CLASS.	Cu (psf)	γ (pcf)	ø (degrees)
1	250# or 400# RIPRAP	0	135.0	45
2	CH	410	107.2	0
3	SM	0	100.0	25
4	OH	420	96.8	0

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BATON ROUGE, LOUISIANA

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Soil Testing Engineers, Inc.
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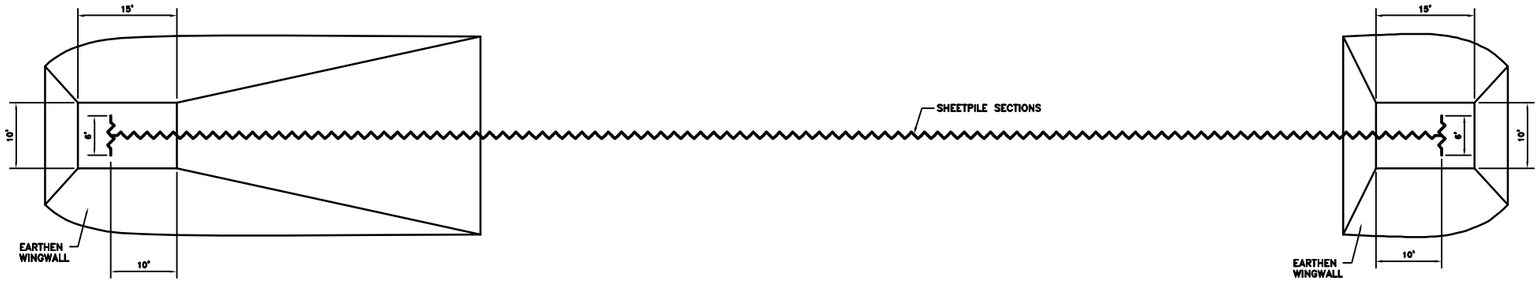
Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02−1073	9−24−02	10

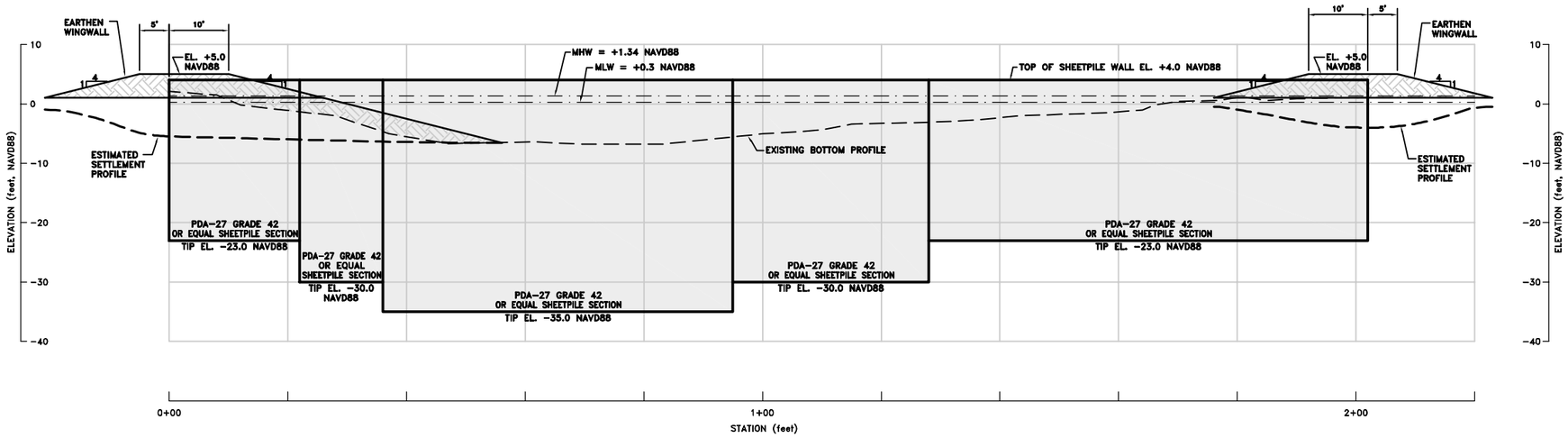
Title: **STABILITY OF ROCK PLUG AT BORING B-12**

REV.	10/31/02	STR. 1 CLASSIFICATION	DMS

P:\2002\02-1073\CADD\021073 STABILITY4.DWG



PLAN
CONTROL SITE #24



PROFILE
CONTROL SITE #24

0 (feet) 10
SCALE

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA
for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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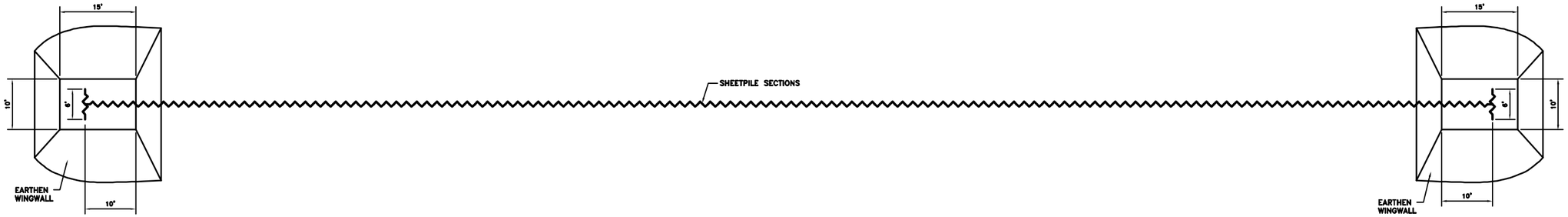
Baton Rouge, LA Lake Charles, LA Metairie, LA

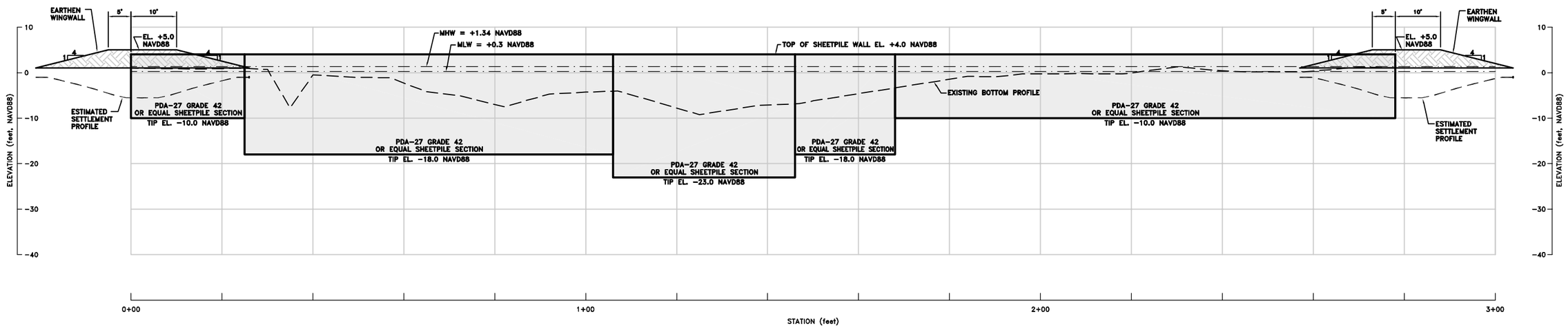
Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Drawing No.:
02-1073	9-25-02	11

Title: SHEETPILE PLUG AT CONTROL SITE #24 (BORING B-6)

Nov 08, 2002 - 8:52am
PA 2002\02-1073\CADD\021073 SHEETPILE SITE 24.DWG



PLAN
CONTROL SITE #16



PROFILE
CONTROL SITE #16

0 (feet) 10
SCALE

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA
for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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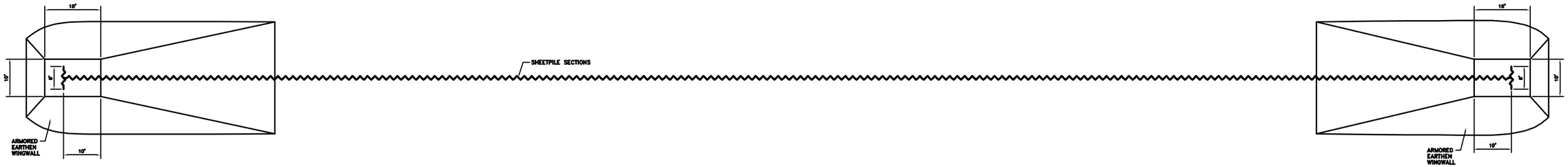
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

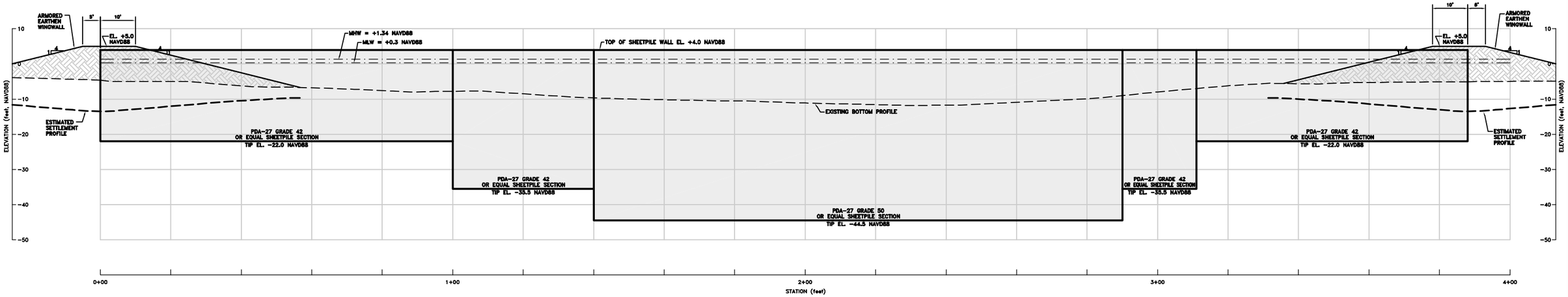
Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Drawing No.:
02-1073	9-25-02	12

Title: SHEETPILE PLUG AT CONTROL SITE #16 (BORING B-7)

Nov 06, 2002 - 9:51am
P:\2002\02-1073\CADD\021073 SHEETPILE SITE 16A.DWG



PLAN
CONTROL SITE #4



PROFILE
CONTROL SITE #4

0 (feet) 10
SCALE

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA
for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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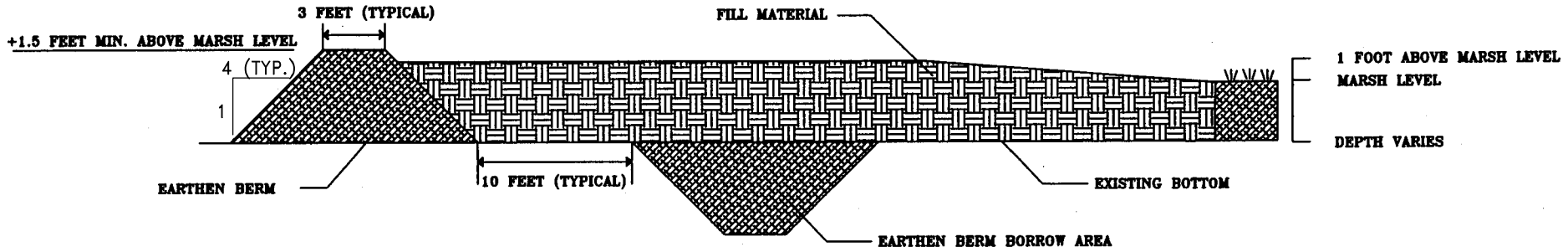
Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Drawing No.:
02-1073	9-25-02	13

Title: SHEETPILE PLUG AT CONTROL SITE #4 (BORING B-8)



EARTHEN BERM CONTAINMENT

DRAWING NOT TO SCALE

REFERENCE
Sketch furnished by LDNR.

REV.	10/31/02	SLOPE PARAMETERS	DMS

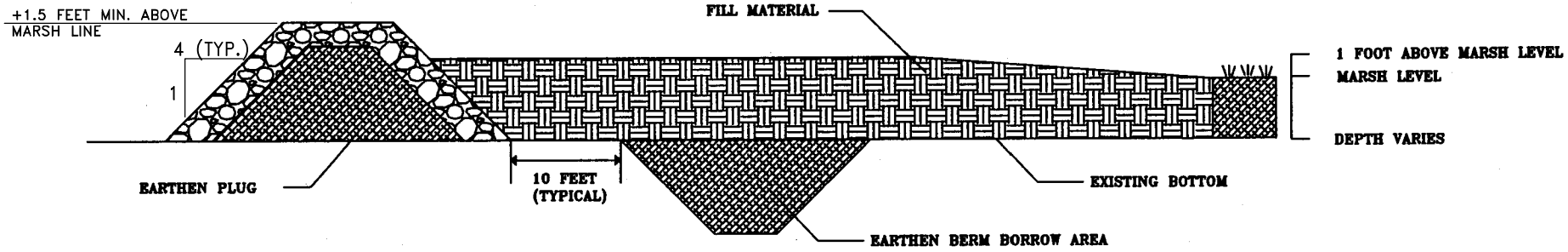
LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02-1073	9-25-02	14

Title:
EARTHEN BERM CONTAINMENT



ARMORED EARTHEN PLUG CONTAINMENT

DRAWING NOT TO SCALE

REFERENCE
Sketch furnished by LDNR.

REV.	10/31/02	SLOPE PARAMETER	DMS

LDNR
NORTH LAKE MECHANT LANDBRIDGE RESTORATION PROJECT (TE-044)
TERREBONNE PARISH, LOUISIANA

for
C-K & ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

STE
Soil Testing Engineers, Inc.
Baton Rouge, LA Lake Charles, LA Metairie, LA

Project Engineer:	Drawn by:	Checked by:
S. Meunier	DMS	
File No.:	Date:	Figure No.:
02-1073	9-25-02	15

Title: **ARMORED EARTHEN PLUG CONTAINMENT**

WEIR AT CONTROL SITE #10

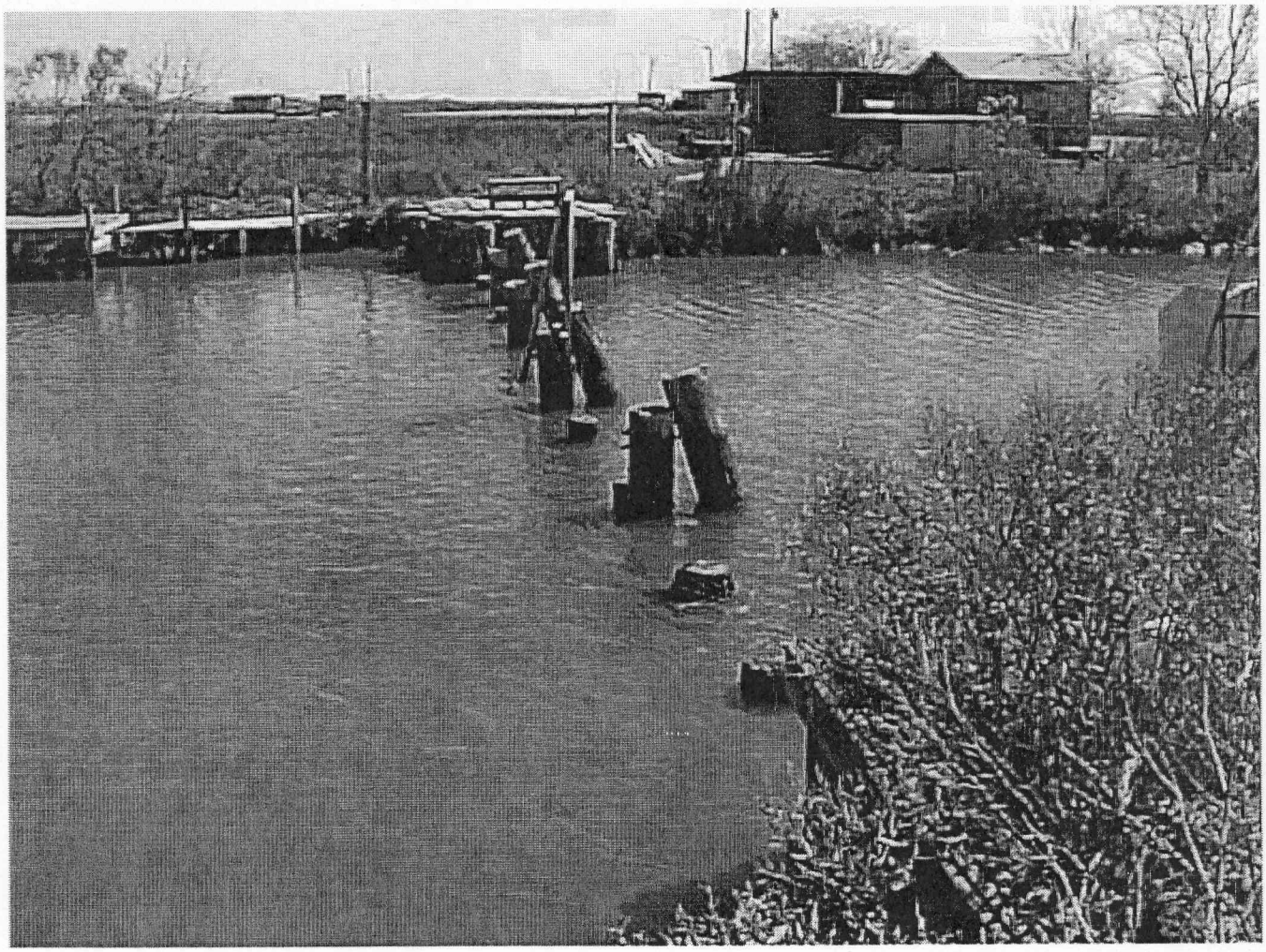


FIGURE 16

APPENDIX A

FIELD AND LABORATORY PROCEDURES

The following paragraphs describe the field and laboratory procedures used for this investigation. Soil Boring Logs are included with this appendix. The boring logs provide the field and laboratory data collected.

A.1 FIELD EXPLORATION

Seventeen soil borings were drilled for this project to depths of 25 and 60 feet. These borings were drilled from July 29th through August 7th of 2002. The approximate locations of the borings are shown on the Boring Plan, Figure 1. The locations were established by LDNR personnel and physically located by C-K Associates, Inc. and STE.

A.1.1 Sampling Procedures

In the cohesive and semi-cohesive soils, relatively undisturbed samples were secured using a three-inch diameter, thin-wall steel tube sampler. In this sampling procedure, the borehole is advanced to the desired level, and the tube is lowered to the bottom of the boring. It is then pushed about two feet into the undisturbed soil in one continuous stroke. The sample and tube are retrieved from the borehole and detached from the drill string.

The samples are extruded in the laboratory by a hydraulic piston onto a rigid sample catcher to minimize disturbance. The sample is then visually classified. The classification includes description of soil color, strength estimates, identification of structural conditions (layering, seams, etc.) and variations (organics, oxide inclusions, etc.). A pocket torvane strength test is performed. Any disturbed portions are discarded, and the sample is sealed to minimize disturbance and moisture loss during transportation to the laboratory.

Twenty-one field vane shear tests (ASTM D 2573) were performed throughout the borings. The raw data were corrected for the plasticity and rotational speed. The peak shear strengths are shown on the boring logs under the column Field Test Results. The details were tabulated in Table 1.

In the less cohesive materials, standard penetration tests were performed; these tests provide a measure of the in situ characteristics of the soil and secure a disturbed sample. In this test, a 2-inch OD, 1.37-inch ID, heavy-walled “split-spoon” sampler is driven into the soil at the bottom of the borehole with a drop hammer weighing 140 pounds and having a stroke of 30 inches. It is first seated six inches, then driven an additional two, six-inch increments. The A Penetration Resistance is the number of blows required to drive the spoon the final 12 inches. It is recorded on the boring log in the following manner:

where the figures in parentheses indicate the number of blows required for each six-inch increment.

A.2 LABORATORY PROCEDURES

Certain samples from the various strata were tested in the laboratory to determine their pertinent physical characteristics. The samples and types of tests performed (other than consolidation tests) were selected by a geotechnical engineer to develop information necessary for appropriate analyses. The testing program conducted is described below.

A.2.1 Strength Tests

The strength characteristics of the various soil strata are important for geotechnical engineering analyses. Thirty-twoUnconsolidated Undrained Triaxial tests (ASTM D 2850), and 41 unconfined compression tests (ASTM D2166) were used to develop this data. Mini vane shear tests were also taken to confirm the results of the laboratory tests.

The results of the strength tests are tabulated in the laboratory data portion of the soil boring log under the column heading "Compressive Strength". The moisture content and dry density data are tabulated in the subsequent two columns within the laboratory data portion of the log.

A.2.2 Classification Tests

In order to classify the soils more definitely than can be done by field methods, Fifty-six Atterberg Limit Determinations (ASTM D4318) and sixty-six Separate Moisture Content Determinations (ASTM D2216) were made. To determine the grain size distribution of the cohesionless soils eight Grain Size Analyses (ASTM D422) were made. The Atterberg Limits data consist of Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI). The relationship among these variables is as follows:

$$PI = LL - PL$$

The Atterberg Limits data are provided within the laboratory portion of the logs under the headings "Liquid Limit" and "Plasticity Index". A “GS” nomenclature is included in the “other” column to indicate that a grain size analysis has been performed. The data is included in the “Notes” box at the bottom of the log.

A.2.3 Consolidation Tests

In order to determine the settlement, fifteen Consolidation tests (ASTM D2216) were made on selected samples in order to determine the compressibility characteristics of the soils. The results are shown graphically as consolidation curves attached to this Appendix A.

DESCRIPTION OF TERMS AND SYMBOLS USED ON SOIL BORING LOG

STE
Soil Testing Engineers, Inc.

FIELD DATA				LABORATORY DATA							Soil Type	DESCRIPTION
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other		

5 10 15 20 25 30 35 40

Description

Classifications are based on visual observations by field & lab representatives as well as results of laboratory data (when available).

Laboratory Data

Compressive Strength

Value based on peak compressive strength. Determined by unconfined compression test unless otherwise noted.

Dry Unit Weight

As determined by method similar to ASTM D-2937.

Water Content

As determined by pertinent portions of ASTM D-2216.

Atterberg Limits

LL : Liquid Limit
PL : Plastic Limit
PI : Plasticity Index
(= Liquid Limit - Plastic Limit)

Other

Results of other tests such as consolidation, permeability, grain size or notes associated with testing program.

Soil Type

Graphical representation of soil type. In accordance with USCS Symbols.

Ground Water Levels

Long-Term Depth
Depth to water after boring is completed (time noted).

Short-Term Depth
Depth to water after initial water encountered prior to proceeding with boring (time noted).

Initially Encountered
Depth where free water was initially encountered during augering.

Sampling/Field Data

3.5 (P) — **Undisturbed**
3" dia. Tube sample

Pocket Penetrometer (P)
Penetration resistance (tons/sq. ft.).

Torvane (T)
Shearing resistance (tons/sq. ft.)

13 b/f (3-7-6) — **Split Spoon**
Std. penetration test

Std. Penetration
No. of blows per foot (blows per each six inch increments).

Auger
Disturbed (auger) collected in accordance with ASTM D-1452.

No Recovery
Sampling attempted but no sample retrieved.

Ground Water Level Data	Boring Advancement Method	Notes
	Boring Abandonment Method	

Form LOGTERMS

Strata Boundaries May Not Be Exact

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-1

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/01/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 13"
LONG. -90° 59' 43"

Surface Elevation: -0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			Vane Shear							FVS		Extremely soft gray ORGANIC CLAY (OH) w/shell
			No (P)	0.07t1	65	66	58	21	37			
	5		No (P)	0.08t2	44	76						
			No (P)		35		32	20	12	MVS1		Extremely soft dark gray CLAY (CH) w/2-inch sand pocket, shell, and organics
			No (P)	0.24	72	51	143	36	107	SG,CS		Extremely soft dark gray ORGANIC CLAY (OH) w/wood
	10											
			No (P)		104					MVS2		Extremely soft dark gray ORGANIC CLAY (OH)
	15											
			No (P)	0.37	41	78						Soft gray CLAY (CH) w/silt layer
	20											
			No (P)	0.19	140	36	157	40	117			Very soft gray ORGANIC CLAY (OH) w/peat and wood
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

1.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

FVS: Field Vane Shear = 48 psf
t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 1.0 psi
t2: Lateral Pressure = 1.6 psi
MVS: Mini Vane Shear
1 = 42 psf, 2 = 63 psf
SG: Specific Gravity = 2.67
CS: See Consolidation Curve

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-2

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 07/31/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 57"
LONG. -90° 59' 22"

Surface Elevation: 0.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.10t1	75	57	83	22	61			Extremely soft black ORGANIC CLAY (OH)
			No (P)		54					MVS1		Very soft gray ORGANIC CLAY (OH), jointed, w/roots
	5		No (P)	0.43	36	85	61	23	38	SG,CS		Soft gray CLAY (CH), jointed, w/organics
			No (P)		43					MVS2		-- w/roots and organics
	10		Vane Shear							FVS		Very soft gray CLAY (CH) w/organics
			No (P)	0.36	37	84	62	24	38			Soft gray CLAY (CH), jointed, w/organics
	15											
			No (P)		35					MVS3		-- w/ferrous stains
	20											
			No (P)	0.34t2	34	86						Soft gray SILTY CLAY (CL) w/organics and fine sand seams
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

1.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 0.5 psi
t2: Lateral Pressure = 8.8 psi
MVS: Mini Vane Shear
1 = 209 psf, 2 = 564 psf, 3 = 794 psf
SG: Specific Gravity = 2.59
CS: See Consolidation Curve
FVS: Field Vane Shear = 127 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

LOG OF SOIL BORING B-3

STE
Soil Testing Engineers, Inc.

C-K & Associates, Inc.
Baton Rouge, LA

File: 02-1073
Date: 08/07/02
Logged by: F. Ward
Driller: D. Thibodaux
Rig: Air Boat

Location: LAT. 29° 20" 16"
LONG. -90° 57' 47"

Surface Elevation: 0.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			Vane Shear		536					FVS		Extremely soft black PEAT (PT) and dark gray ORGANIC CLAY (OH) w/roots
			No (P)	0.04t1	314	19	119	33	86			Extremely soft dark gray and black PEAT (PT) w/clay and roots
	5		No (P)		534					MVS1		
										MVS2		Gray ORGANIC CLAY (OH) w/roots
			No (P)	0.12t2	67	67	64	25	39	CS		Very soft gray ORGANIC CLAY (OH) w/silty sand seams
			No (P)		25							Very loose gray SILTY SAND (SM) w/clay seams
	10				34							Very soft dark gray SILTY CLAY (CL) w/sand and shell
			No (P)	0.18	132	38						Very soft dark gray and black ORGANIC CLAY (OH) w/peat
	15											
					97					MVS3		
			No (P)		129					MVS4		-- w/3-inches of peat and shell
	20											
			No (P)	0.09	97	46	116	34	82			
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

1.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

FVS: Field Vane Shear = 25 psf
t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 1.0 psi
t2: Lateral Pressure = 2.4 psi
MVS: Mini Vane Shear
1 = 21 psf, 2 = 41 psf, 3 = 104 psf, 4 = 251 psf
CS: See Consolidation Curve

Strata Boundaries May Not Be Exact

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-4

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 08/07/02
Logged by: F. Ward
Driller: D. Thibodaux
Rig: Air Boat

Location: LAT. 29° 20" 47"
LONG. -90° 55' 45"

Surface Elevation: 0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)		72					MVS1		Very soft gray ORGANIC CLAY (OH), disturbed
			No (P)	0.17	43	75	55	21	34			-- w/silt pockets and seams
	5		Vane Shear							FVS		Extremely soft ORGANIC CLAY (OH)
			No (P)	0.27	48	70	40	23	17	CS		Soft gray SILTY CLAY (CL) w/organics
			No (P)		53					MVS2		Very soft gray ORGANIC CLAY (OH) w/sand lenses and silty sand seams
	10											
			No (P)	0.14	45	70						-- w/sand layers, seams, and pockets
	15											
			No (P)		53					MVS3		
	20											
			No (P)	0.18	55	69	80	29	51			
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

0.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

MVS: Mini Vane Shear
1 = 167 psf, 2 = 167 psf, 3 = 209 psf
FVS: Field Vane Shear = 39 psf
CS: See Consolidation Curve

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-5

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 08/07/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 32"
LONG. -90° 56' 56"

Surface Elevation: 0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.05t1	124	33						Extremely soft dark gray PEAT (PT)
			Vane Shear							FVS		
	5		No (P)									
			No (P)		30					MVS1		Very soft gray SILTY CLAY (CL) w/sand seams and lenses
			No (P)		39							
	10											
			No (P)		40							Very loose dark gray and gray SANDY SILT (ML) w/organics
	15											
			No (P)	1.27t2	31	80	32	28	4			Firm gray and black SANDY SILT (ML) w/ 1/8-inch clay seams
	20											
			No (P)		105	42	154	43	111	MVS2,CS		Soft dark gray ORGANIC CLAY (OH) w/silt traces
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

0.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 0.5 psi
t2: Lateral Pressure = 5.6 psi
FVS: Field Vane Shear = 37 psf
MVS: Mini Vane Shear
1 = 188 psf, 2 = 334 psf
CS: See Consolidation Curve

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-6

STE
Soil Testing Engineers, Inc.

Sheet 1 of 2

File: 02-1073
Date: 08/03/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Air Boat

Location: LAT. 29° 20" 22"
LONG. -90° 59' 09"

Surface Elevation: -0.5 (ft., NAVD88)

Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
▽			No (P)	0.03t1	218	24	177	54	123			Extremely soft black and gray PEAT (PT) w/1-inch of gray organic clay
			No (P)		117					MVS1		
	5		No (P)	0.08t2	159	34	92	30	62	SG,CS		-- w/alternating layers of gray silt
			No (P)		288					MVS2		-- w/wood
					229					MVS3		-- w/silty sand seams and wood
			Vane Shear							FVS1		
	10											
			No (P)	0.12t3	167	31	175	50	125			Very soft gray ORGANIC CLAY (OH) w/peat seams
	15											
			No (P)		251					MVS4		-- w/peat and wood
	20		Vane Shear							FVS2		
			No (P)	0.23	134	35						-- w/peat and wood traces
	25											
			No (P)		47							Very soft gray CLAYEY SILT (ML) w/fine sand
	30		Vane Shear							FVS3		
			0.5 (P)	0.36t4	35	84	37	19	18			Soft gray ORGANIC CLAY (OL) w/alternating silty sand layers
	35		0.5 (P)									
			0.25 (P)		50					MVS5		Very soft gray CLAY (CH) w/sand seams and organics
	40		0.5 (P)		49					MVS6		

Continued Next Page

Ground Water Level Data

▽ 1.5 ft. Water Depth at Borehole

Boring Advancement Method

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
Lateral Pressure:
t1 = 0.5 psi, t2 = 1 psi, t3 = 2 psi, t4 = 12 psi
MVS: Mini Vane Shear
1 = 21 psf, 2 = 21 psf, 3 = 84 psf
4 = 209 psf, 5 = 188 psf, 6 = 167 psf
SG: Specific Gravity = 2.53
CS: See Consolidation Curve
FVS: Field Vane Shear
1 = 30 psf; 2 = 104 psf, 3 = 195 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-6

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/03/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Air Boat

Location: LAT. 29° 20" 22"
LONG. -90° 59' 09"

Surface Elevation: -0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
												Gray CLAY (CH) w/silty sand seams
			No (P)	0.18t5	50	66	62	22	40			Very soft gray ORGANIC CLAY (OH) w/silty sand seams
	45		No (P)									
			0.5 (P)	0.30	68	59						Soft gray ORGANIC CLAY (OH)
	50											
			0.25 (P)		67					MVS7		Very soft gray ORGANIC CLAY (OH), jointed
	55											Soft gray ORGANIC CLAY (OH) w/silty sand seams
			0.5 (P)	0.46	75	54	109	33	76			
	60											Boring completed at 60 ft.
	65											
	70											
	75											
	80											

Ground Water Level Data

1.5 ft. Water Depth at Borehole

Boring Advancement Method

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t5: Lateral Pressure = 12 psi
MVS: Mini Vane Shear
7 = 230 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-7

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/03/02
Logged by: B. Ray
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 00"
LONG. -90° 58' 32"

Surface Elevation: -0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.02	685	8	492	136	356			Extremely soft black PEAT (PT)
			No (P)		376							
	5		No (P)	0.07	52	67	54	21	33	SG,CS		Extremely soft gray ORGANIC CLAY (OH) w/silty sand seams
			No (P)		66							
			No (P)	0.13t1	36	81	38	25	13			Very soft gray ORGANIC SILTY CLAY (OL)
	10		Vane Shear							FVS1		
			No (P)	0.20t2	84	48						Very soft dark gray ORGANIC CLAY (OH) w/shells
	15											
			No (P)		85					MVS1		-- w/sand and shell
	20		Vane Shear							FVS2		
			No (P)	0.16	67	58	90	28	62			-- w/wood
	25											
			No (P)		45							Soft gray ORGANIC CLAY (OH) w/silty sand seams and layers
	30		Vane Shear							FVS3		
			0.5 (P)	0.32	34	79						-- w/alternating layers of clayey silt
	35											
			No (P)		57					MVS2		-- w/silty sand seams
	40											

Continued Next Page

Ground Water Level Data

1.5 ft. Water Depth at Borehole

Boring Advancement Method

Boring Abandonment Method

Notes

SG: Specific Gravity = 2.69
CS: See Consolidation Curve
t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 3 psi
t2: Lateral Pressure = 2.5 psi
FVS: Field Vane Shear
1 = 140 psf, 2 = 104 psf, 3 = 140 psf
MVS: Mini Vane Shear
1 = 146 psf, 2 = 188 psf

Strata Boundaries May Not Be Exact

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-7

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/03/02
Logged by: B. Ray
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 00"
LONG. -90° 58' 32"

Surface Elevation: -0.5 (ft., NAVD88)

Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
												Soft gray ORGANIC CLAY (OH) w/silty sand seams and layers
	45		No (P)	0.24	51	72	61	20	41			Very soft gray ORGANIC CLAY (OH) w/silt seams and pockets
	50		No (P)		56					MVS3		-- w/silty sand seams
	55		0.25 (P)	0.27	60	63						Soft gray ORGANIC CLAY (OH)
	60		0.5 (P)	0.49	59	65	77	23	54	MVS4		
												Boring completed at 60 ft.
	65											
	70											
	75											
	80											

Ground Water Level Data

1.5 ft. Water Depth at Borehole

Boring Advancement Method

Boring Abandonment Method

Notes

MVS: Mini Vane Shear
3 = 167 psf, 4 = 230 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-8

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/05/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 22"
LONG. -90° 56' 12"

Surface Elevation: -4.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.08	63	62	73	25	48			Extremely soft gray ORGANIC CLAY (OH) w/sand seams
			No (P)		59					MVS1		
					40					MVS2		-- w/6-inches of gray sand
	5		No (P)	3.24t1	47	89	30	21	9	SG1,CS		Dense 5-inches of gray SILTY SAND (SM) and 3-inches of gray ORGANIC CLAY (OH)
			No (P)		47					MVS3		
			No (P)	0.11	86	49						Very soft gray ORGANIC CLAY (OH)
	10		Vane Shear							FVS1		
			No (P)	0.12	103	44	99	30	69	SG2,CS		-- w/peat
	15											
			No (P)									
	20											
			No (P)		58					MVS4		-- w/sand seams
					88					MVS5		-- w/shell, roots, sand layers, pockets, and seams
	25											
			No (P)	0.25t2	89	33						
	30		Vane Shear							FVS2		
			No (P)		38					MVS6		-- w/alternating layers of sand, silt, and mica
	35											
			No (P)	0.45t3	48	71	46	19	27	SG3,CS		Soft gray SILTY CLAY (CL) w/silty sand lenses and layers
	40											

Continued Next Page

Ground Water Level Data

5.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 60 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

MVS: Mini Vane Shear
1 = 125 psf, 2 = 209 psf, 3 = 84 psf
4 = 125 psf, 5 = 209 psf, 6 = 209 psf
SG1: Specific Gravity = = 2.69
CS: See Consolidation Curve
FVS: Field Vane Shear
1 = 114 psf, 2 = 170 psf
SG2: Specific Gravity = 2.54
SG: Specific Gravity = 2.69
CS: See Consolidation Curve

Strata Boundaries May Not Be Exact

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-8

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/05/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 22"
LONG. -90° 56' 12"

Surface Elevation: -4.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
	45		No (P)		45					MVS7		Soft gray SILTY CLAY (CL) w/silty sand lenses and layers -- w/alternating layers of sand
	50		No (P)	0.40	46	69						-- w/silt lenses
	55		No (P)		47					MVS8		Soft gray CLAY (CH) w/silt seams
	60		No (P)	0.51	54	66	80	27	53			
	65											Boring completed at 60 ft.
	70											
	75											
	80											

Ground Water Level Data

5.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 60 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

MVS: Mini Vane Shear
7 = 292 psf, 8 = 376 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-9

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 07/31/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 31"
LONG. -90° 59' 43"

Surface Elevation: -1.5 (ft., NAVD88)

Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.11	54	67	61	20	41			Very soft dark gray ORGANIC CLAY (OH) w/silt traces and roots
			No (P)		62					MVS		
	5		No (P)	0.22	52	66						Very soft gray ORGANIC CLAY (OH), jointed
			No (P)	0.33	41	78	48	20	28	SG,CS		Soft gray ORGANIC CLAY (OH) w/silt seams
	10		Vane Shear							FVS		
	15		No (P)	0.35	45	75						-- w/trace of silt
	20		No (P)		59							-- w/roots
	25		No (P)	0.48	63	60	88	31	57			-- w/roots
												Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

2.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

MVS: Mini Vane Shear = 146 psf
SG: Specific Gravity = 2.67
CS: See Consolidation Curve
FVS: Field Vane Shear = 45 psf

Strata Boundaries May Not Be Exact

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-10

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 07/31/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 19" 55"
LONG. -90° 59' 53"

Surface Elevation: -0.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.03t1	483	12	271	68	203			Extremely soft black PEAT (PT) and gray ORGANIC CLAY (OH) w/peat seams
			No (P)	0.07t2	107	46						
	5		Vane Shear							FVS		Very soft gray ORGANIC CLAY (OH) w/sand seams
			No (P)	0.11t3	64	60	64	25	39	SG,CS		
			No (P)		50					MVS1		-- w/silt and organics
	10				42					MVS2		-- w/sand seams and 3-inches of gray silty sand
			No (P)	0.21t4	47	75						-- w/silty sand seams and gray silty sand
	15											
			No (P)		188					MV3		-- w/3-inches of black peat w/roots
	20											
			No (P)	0.49t5	31	84	32	22	10			Soft gray CLAYEY SAND (SC) w/silt
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

1.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
Lateral Pressure:
t1 = 0.5 psi, t2 = 1 psi, t3 = 2 psi, t4 = 4.6 psi, t5 = 8.0 psi
FVS: Field Vane Shear = 44 psf
SG: Specific Gravity = 2.71
CS: See Consolidation Curve
MVS: Mini Vane Shear
1 = 42 psf, 2 = 125 psf. 3 = 167 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-11

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 07/30/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 19"
LONG. -90° 57' 19"

Surface Elevation: -4.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
▽			No (P)	0.03t1	89	50	72	21	51			Extremely soft dark gray ORGANIC CLAY (OH) w/shell, peat, and sand
			No (P)		40					MVS1		-- w/silty sand pockets and 4-inches of gray silty sand
	5		No (P)	1.14t2	31	95						Medium gray SILTY SAND (SM) w/mica and organic traces
			Vane Shear		34					FVS		Very soft gray SILTY CLAY (CL) w/gray silty sand seams and 7-inch layer of shell
	10		No (P)	1.36t3	31	95						Medium gray SILTY SAND (SM) w/silty clay seams and shell
	15		No (P)		95					MVS2		Very soft gray ORGANIC CLAY (OH)
	20		No (P)	0.30	162	30						Soft black PEAT (PT) w/gray clay layer
	25		No (P)	0.14	30	85	39	17	22			Very soft gray ORGANIC CLAY (OL) w/alternating silty sand seams
												Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

▽ 5.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 0.5 psi
t2: Lateral Pressure = 2.0 psi
t3: Lateral Pressure = 4.0 psi
MVS: Mini Vane Shear
1 = 104 psf, 2 = 125 psf
FVS: Field Vane Shear = 128 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

LOG OF SOIL BORING B-12

STE
Soil Testing Engineers, Inc.

C-K & Associates, Inc.
Baton Rouge, LA

Sheet 1 of 1

File: 02-1073
Date: 08/05/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 21" 11"
LONG. -90° 54' 24"

Surface Elevation: -3.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)	0.24t1	42	80	40	25	15			Very soft gray very SANDY CLAY (CL) w/organics
			No (P)	0.15t2	44	75						Very soft gray SILTY CLAY (CL) w/silty sand seams
	5		No (P)	0.44t3	38	93	34	26	8	SG,CS		-- w/sand seams
			Vane Shear							FVS		Very soft gray very SILTY CLAY (CL) to gray CLAYEY SILT (ML) w/sand
			No (P)	0.21	34 32	79						
	10											Soft gray CLAY (CH) w/silt seams and sand layers
			No (P)	0.41	60	67						
	15				30							Gray SILTY SAND (SM) w/clay
												Soft gray ORGANIC CLAY (OH)
			No (P)	0.42	76	55	106	31	75			
	20											
			No (P)									
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

4.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 0.5 psi
t2: Lateral Pressure = 1 psi
t3: Lateral Pressure = 1.5 psi
SG: Specific Gravity = 2.67
CS: See Consolidation Curve
FVS: Field Vane Shear = 136 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-13

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 08/02/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 19" 17"
LONG. -90° 59' 05"

Surface Elevation: -3.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)		98							Extremely soft to soft gray ORGANIC CLAY (OH)
			Vane Shear		66		63	23	40	GS1,FVS		Extremely soft gray ORGANIC CLAYEY SILT (OL) w/sand and shell
	5		No (P)		43	89						Extremely soft to soft gray SANDY CLAY (CL) w/shell and peat seams
			No (P)		56					MVS		Extremely soft to soft gray ORGANIC CLAY (OH) w/silty sand pockets and seams
			No (P)		77	53	53	22	31	GS2		Extremely soft to soft gray ORGANIC CLAY (OH) w/silt pockets and seams
	10											
			No (P)		98							-- w/peat pockets
	15											
			No (P)		101		132	39	93	GS3		-- w/peat and fine sand
	20											
			No (P)		89							-- w/shell, peat, and organics
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

4.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

GS: Particle Size Analysis
GS1: Gravel = 1.7%, Sand = 11.8%, Silt = 59.6%, Clay = 27%
GS2: Sand = 0.4%, Silt = 31.5%, Clay = 68.1%
GS3: Sand = 7.5%, Silt = 35.9%, Clay = 56.6%
FVS: Field Vane Shear = 63 psf
MVS: Mini Vane Shear = psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-14

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/02/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 19" 19"
LONG. -90° 56' 38"

Surface Elevation: -5.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)		34							Very loose dark gray very CLAYEY SAND (SC)
			No (P)		33	88	35	18	17	GS1		-- w/shell
	5		No (P)		31							-- w/shell
			Vane Shear		36					FVS		-- w/shell and gravel
			No (P)		77	54	81	23	58	GS2		Extremely soft to soft gray ORGANIC CLAY (OH) w/peat
	10											
			No (P)		97							-- w/wood and peat
	15											
			No (P)		149							-- w/black peat
	20											
			No (P)		70		109	39	70	GS3		Extremely soft to soft black PEAT (PT) w/gray silty clay and shell
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

6.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

GS: Particle Size Analysis
GS1: Gravel = 0.3%, Sand = 51.3%, Silt = 31.7%, Clay = 16.7%
GS2: Sand = 1.3%, Silt = 42.8%, Clay = 55.9%
GS3: Gravel = 0.5%, Sand = 8.3%, Silt = 64%, Clay = 27.1%
FVS: Field Vane Shear = 101 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-15

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 07/29/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 44"
LONG. -90° 56' 53"

Surface Elevation: -1.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			No (P)		93		107	33	74			Very soft gray ORGANIC CLAY (OH)
			No (P)	0.14t1	88	49						
	5		Vane Shear							FVS		Extremely soft gray ORGANIC CLAY (OH) w/silty sand seams
			No (P)	0.25t2	60	66	45	21	24	SG,CS		Soft gray ORGANIC CLAY (OL) w/silty sand seams
	10		No (P)		84					MVS1		-- w/1/8-inch silty sand seams
			No (P)	0.26	52	69						Soft gray SILTY CLAY (CL) w/sand seams and organics
	15											
			No (P)		42					MVS2		Gray ORGANIC SLIGHTLY SILTY CLAY (OH) w/silty sand seams
	20											
			No (P)	0.63	172	28	226	75	151			Medium black PEAT (PT) w/2-inches of gray clay and wood
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

2.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t: Unconsolidated, Undrained Triaxial Compression Test
t1: Lateral Pressure = 1 psi
t2: Lateral Pressure = 2 psi
FVS: Field Vane Shear = 81 psf
SG: Specific Gravity = 2.74
CS: See Consolidation Curve
MVS: Mini Vane Shear
1 = 84 psf, 2 = 167 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-16

STE
Soil Testing Engineers, Inc.

Sheet 1 of 1

File: 02-1073
Date: 07/31/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 14"
LONG. -90° 59' 57"

Surface Elevation: -3.5 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			Vane Shear		127					FVS		Extremely soft gray ORGANIC CLAY (OH) w/wood, shell, and silt
			No (P)		133	37	82	28	54	GS1		Extremely soft to soft dark gray ORGANIC CLAYEY SILT (OL) w/shell and sand
	5		No (P)		31							
			No (P)		66							-- w/2-inch gray very silty clay layer
			No (P)		57	63	75	23	52	GS2		-- w/clay and sand
	10											
			No (P)		63							Very soft to soft gray ORGANIC CLAY (OH)
	15											
			No (P)		93							
	20											
			No (P)		91							
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

4.5 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

FVS: Field Vane Shear = 32 psf
GS: Particle Size Analysis
GS1: Gravel = 5.8%, Sand = 8.5%, Silt = 51.4%, Clay = 34.3%
GS2: Sand = 1.5%, Silt = 61.8%, Clay = 36.7%

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02

LDNR
North Lake Mechant
Landbridge Restoration Project
(TE-44)
Terrebonne Parish, LA

C-K & Associates, Inc.
Baton Rouge, LA

LOG OF SOIL BORING B-17

STE
Soil Testing Engineers, Inc.

File: 02-1073
Date: 08/02/02
Logged by: F. Ward
Driller: Triangle Resources
Rig: Barge

Location: LAT. 29° 20" 37"
LONG. -90° 59' 54"

Surface Elevation: -3.0 (ft., NAVD88)

FIELD DATA				LABORATORY DATA								
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other	Soil Type	Description
			Vane Shear							FVS		Extremely soft gray SILTY CLAY (CL) to CLAYEY SILT (ML) w/organics
			No (P)									
	5		No (P)	0.05t	97	48						Extremely soft gray ORGANIC CLAY (OH) w/silty sand seams
			No (P)	0.05	75	50	101	34	67	CS		-- w/silty sand pockets
			No (P)		98					MVS1		
	10											
			No (P)	0.10	93	45						-- w/silty sand seams
	15											
			No (P)		85					MVS2		-- w/silty sand pockets
	20											
			No (P)	0.13	93	46	106	32	74			Very soft gray ORGANIC CLAY (OH)
	25											Boring completed at 25 ft.
	30											
	35											
	40											

Ground Water Level Data

4.0 ft. Water Depth at Borehole

Boring Advancement Method

4" Dia. Rotary Wash:
0 to 25 ft.

Boring Abandonment Method

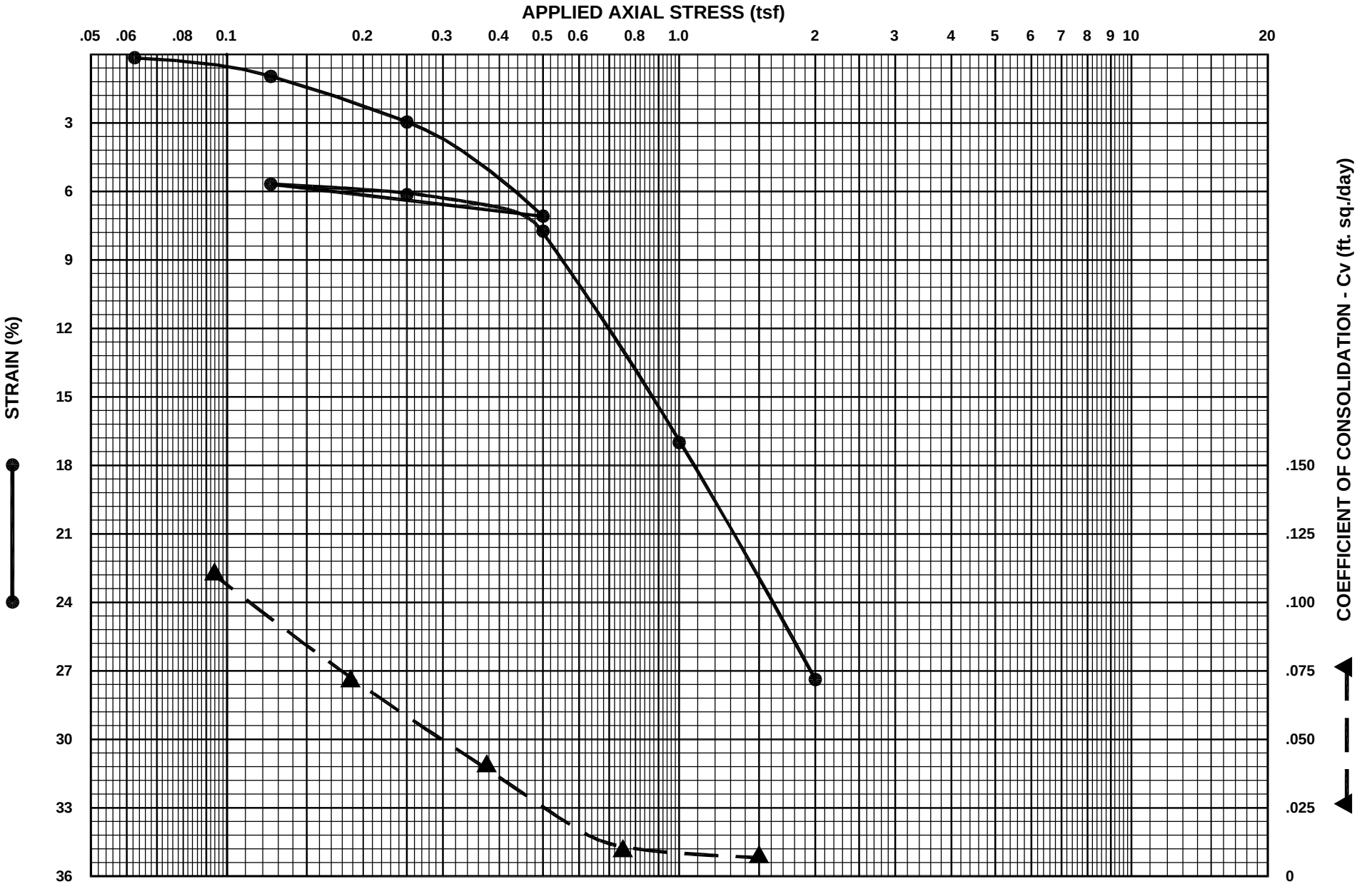
Borehole grouted upon completion

Notes

FVS: Field Vane Shear = 11 psf
t: Unconsolidated, Undrained Triaxial Compression Test
Lateral Pressure = 1.0 psi
CS: See Consolidation Curve
MVS: Mini Vane Shear
1 = 84 psf, 2 = 167 psf

Strata Boundaries May Not Be Exact

02-1073 LDNR LOG 021073.GPJ LOG01.GDT 09/25/02



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-1
DEPTH (feet): 8-10
MATERIAL: Dark gray ORGANIC CLAY

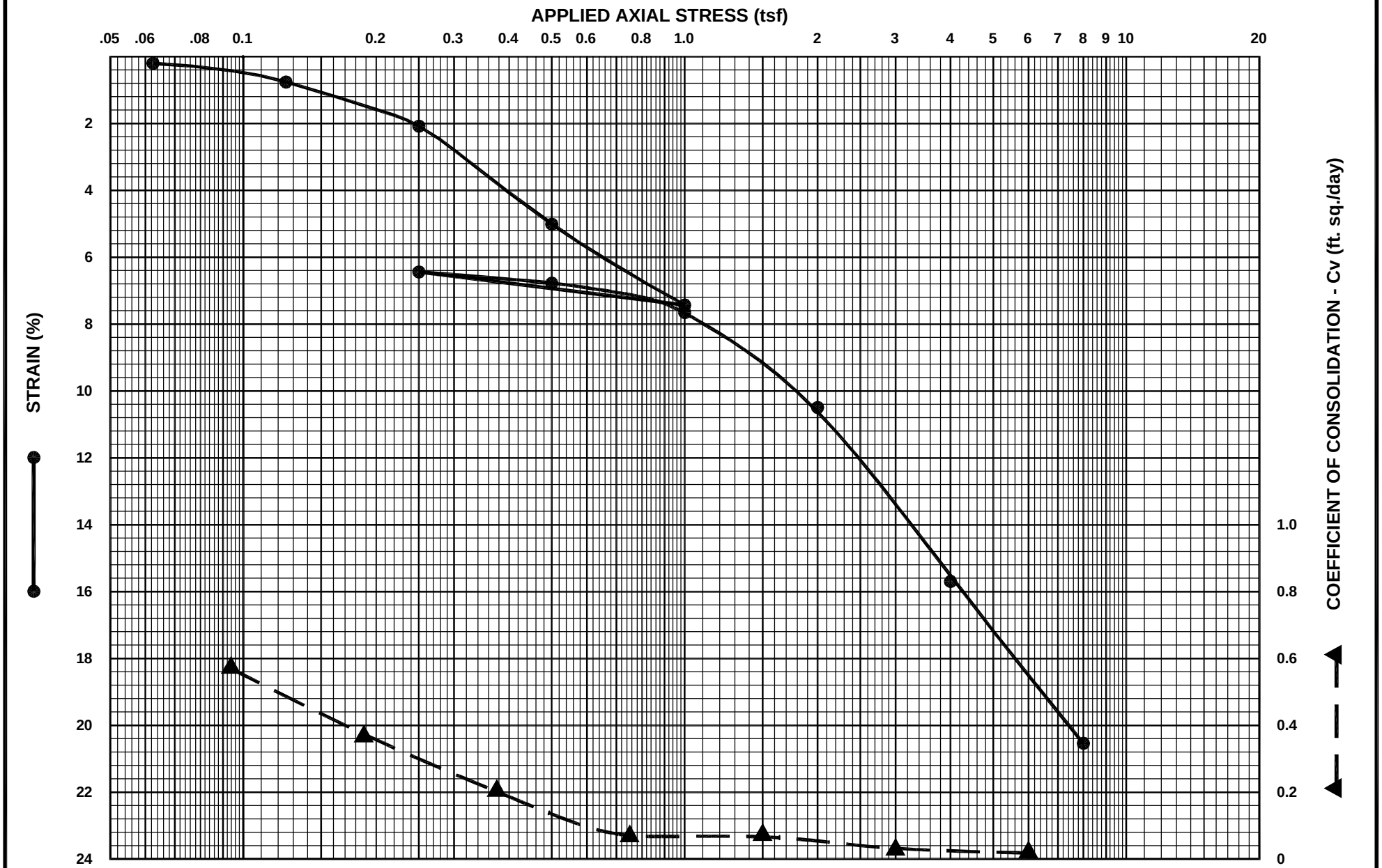
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	112.5	LL = 143
INITIAL DRY DENSITY (lbs./cu.ft.) =	40.3	PL = 36
FINAL MOISTURE CONTENT (%) =	76.7	PI = 107

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-2
DEPTH (feet): 4-6
MATERIAL: Gray CLAY, jointed

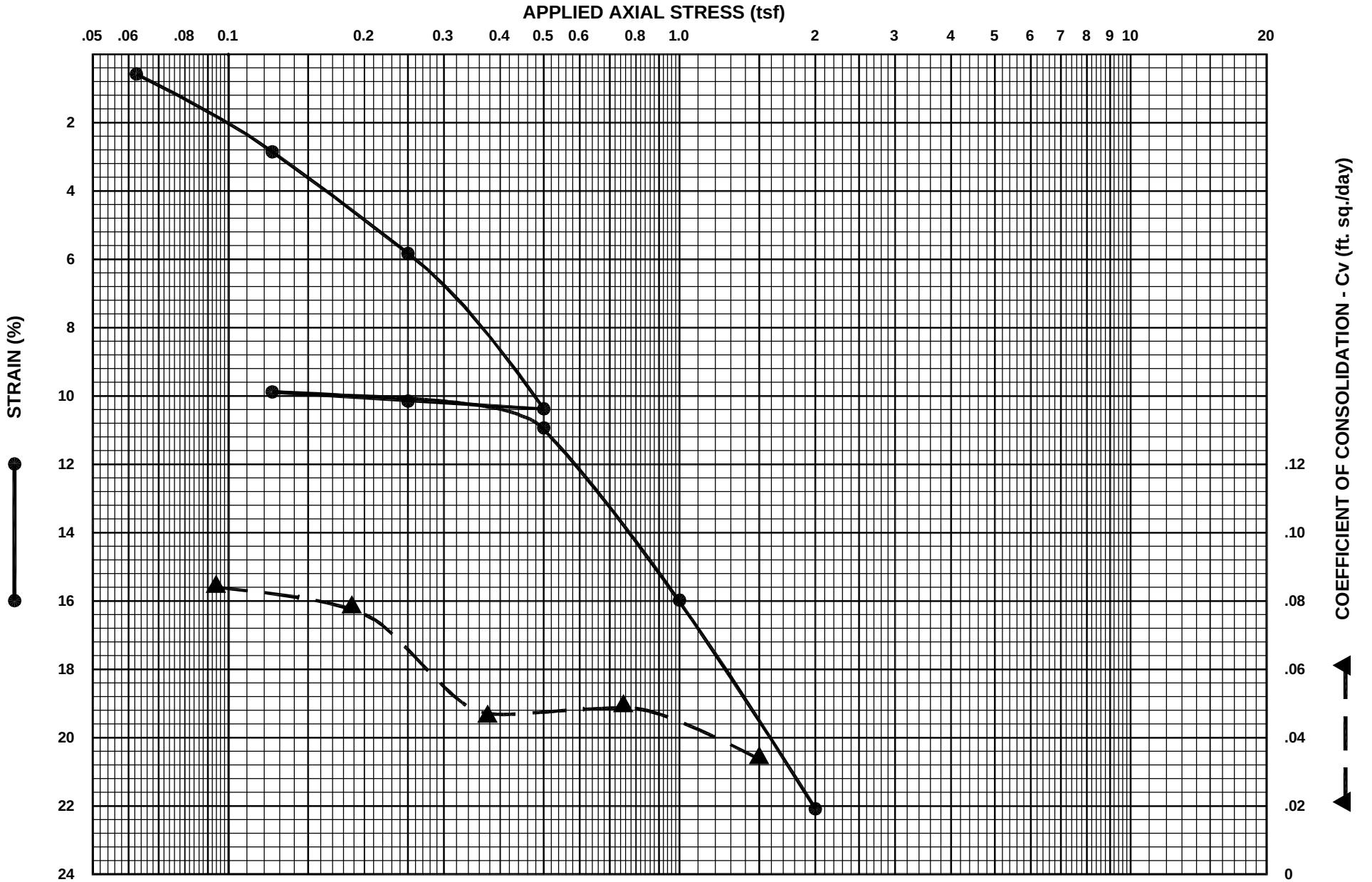
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	38.1	LL = 61
INITIAL DRY DENSITY (lbs./cu.ft.) =	78.7	PL = 23
FINAL MOISTURE CONTENT (%) =	30.3	PI = 38

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-3
DEPTH (feet): 6-8
MATERIAL: Gray ORGANIC CLAY

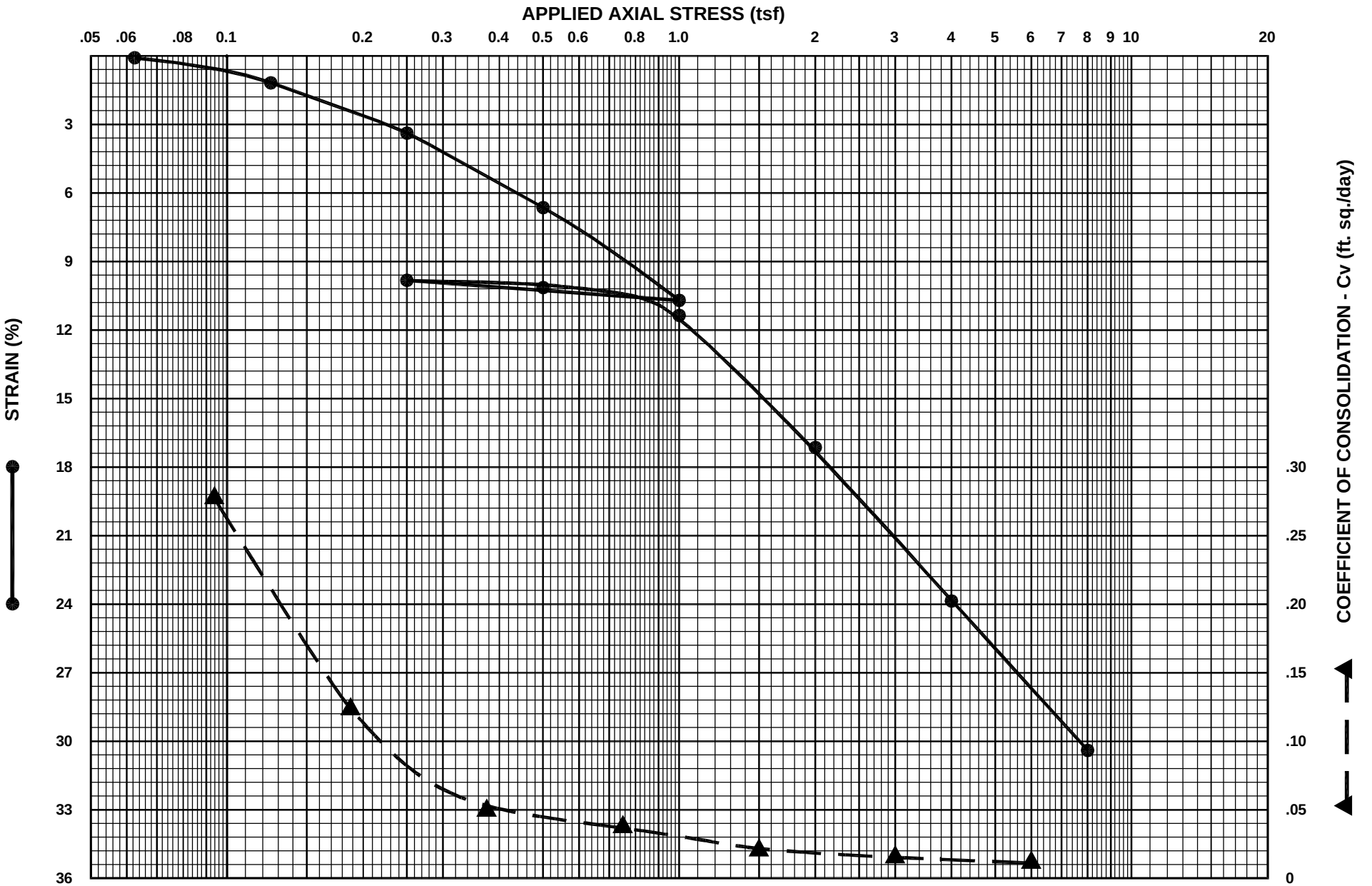
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	67.5	LL = 64
INITIAL DRY DENSITY (lbs./cu.ft.) =	57.9	PL = 25
FINAL MOISTURE CONTENT (%) =	46.3	PI = 39

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

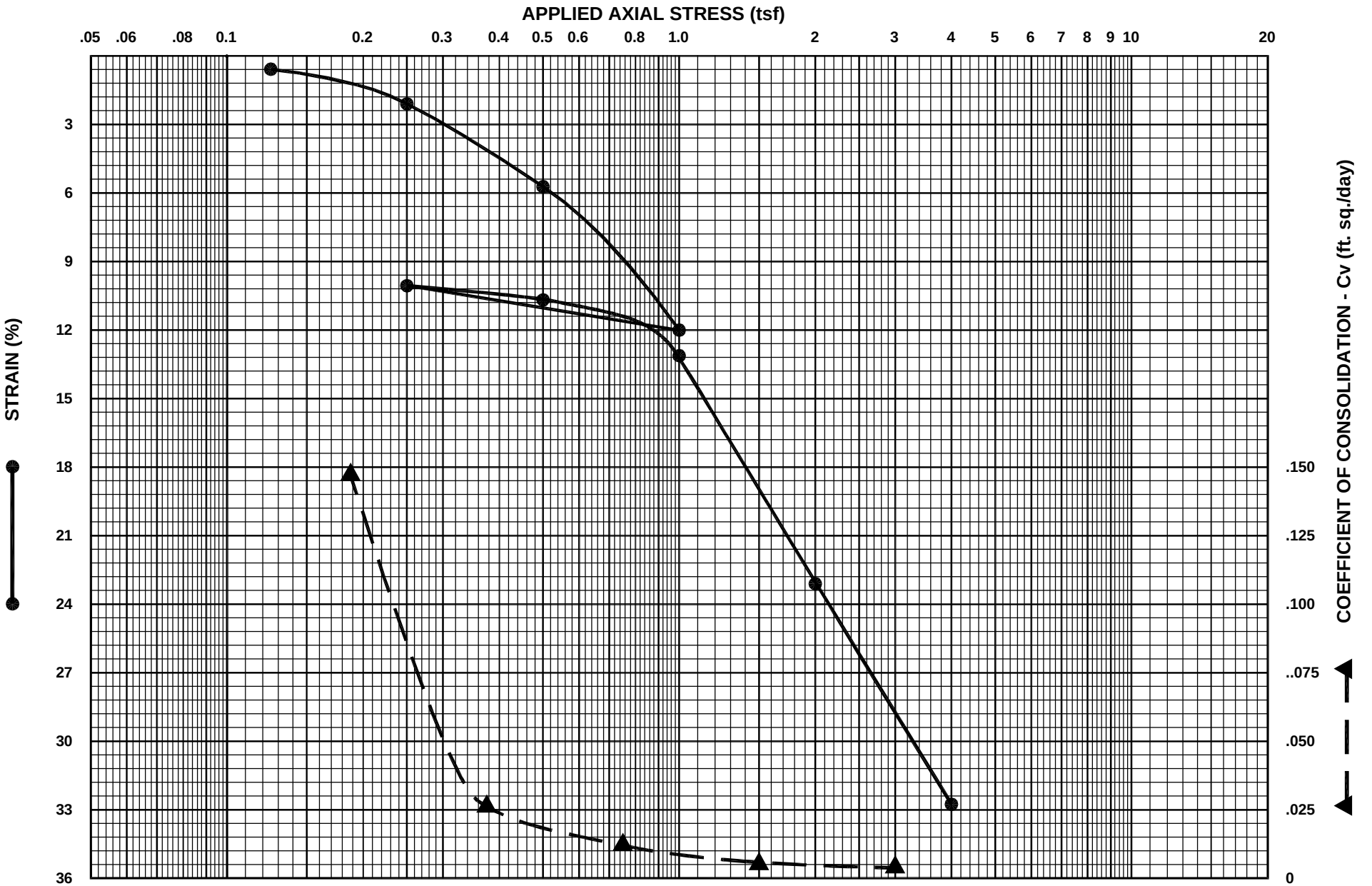
BORING NO.: B-4
DEPTH (feet): 6-8
MATERIAL: Gray SILTY CLAY w/organics
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	152.1	LL = 40
INITIAL DRY DENSITY (lbs./cu.ft.) =	39.2	PL = 23
FINAL MOISTURE CONTENT (%) =	34.5	PI = 17

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-5
DEPTH (feet): 23-25
MATERIAL: Dark gray ORGANIC CLAY

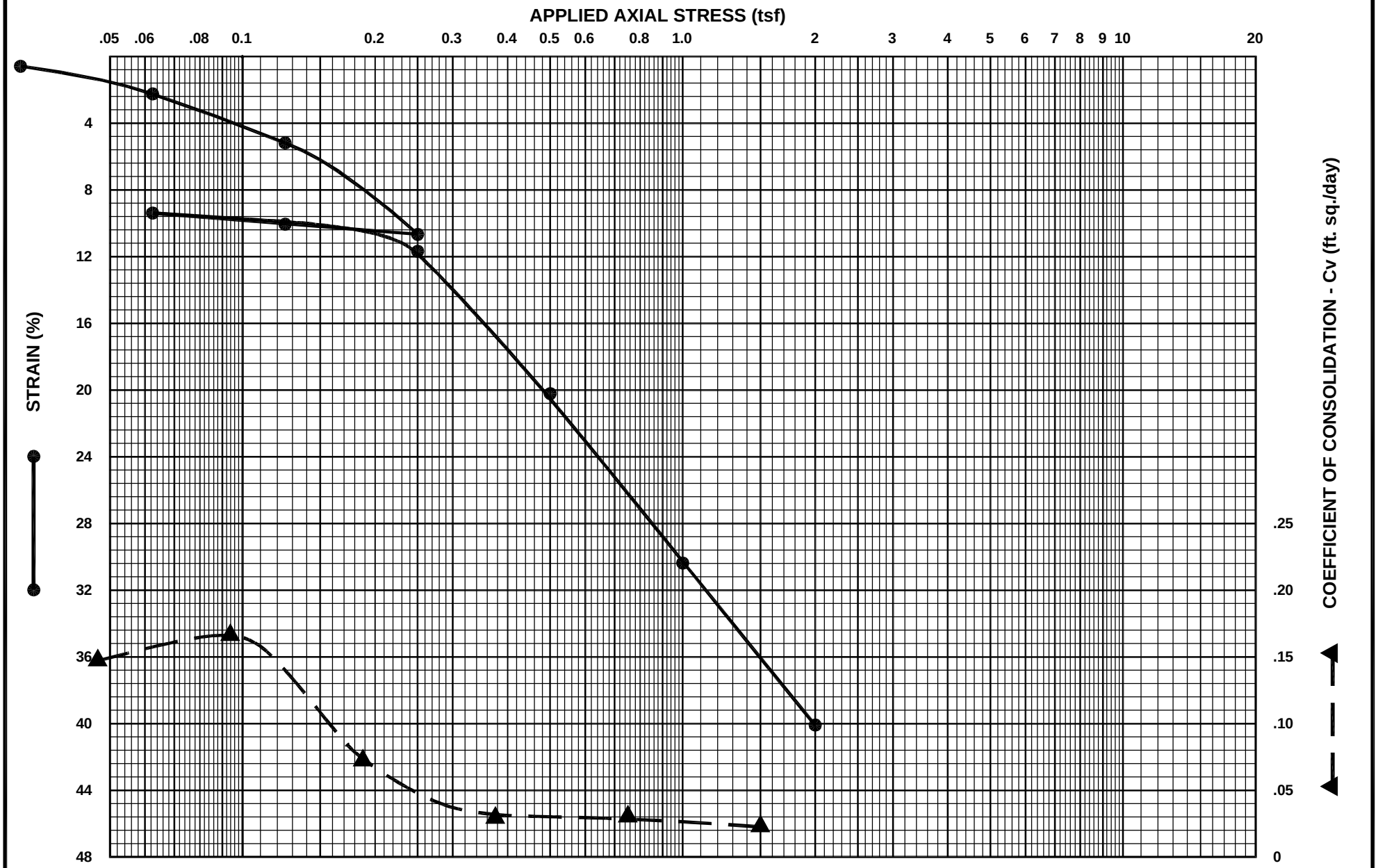
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	106.2	LL = 154
INITIAL DRY DENSITY (lbs./cu.ft.) =	46.7	PL = 43
FINAL MOISTURE CONTENT (%) =	65.0	PI = 111

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-6
DEPTH (feet): 4-6
MATERIAL: Black & gray PEAT

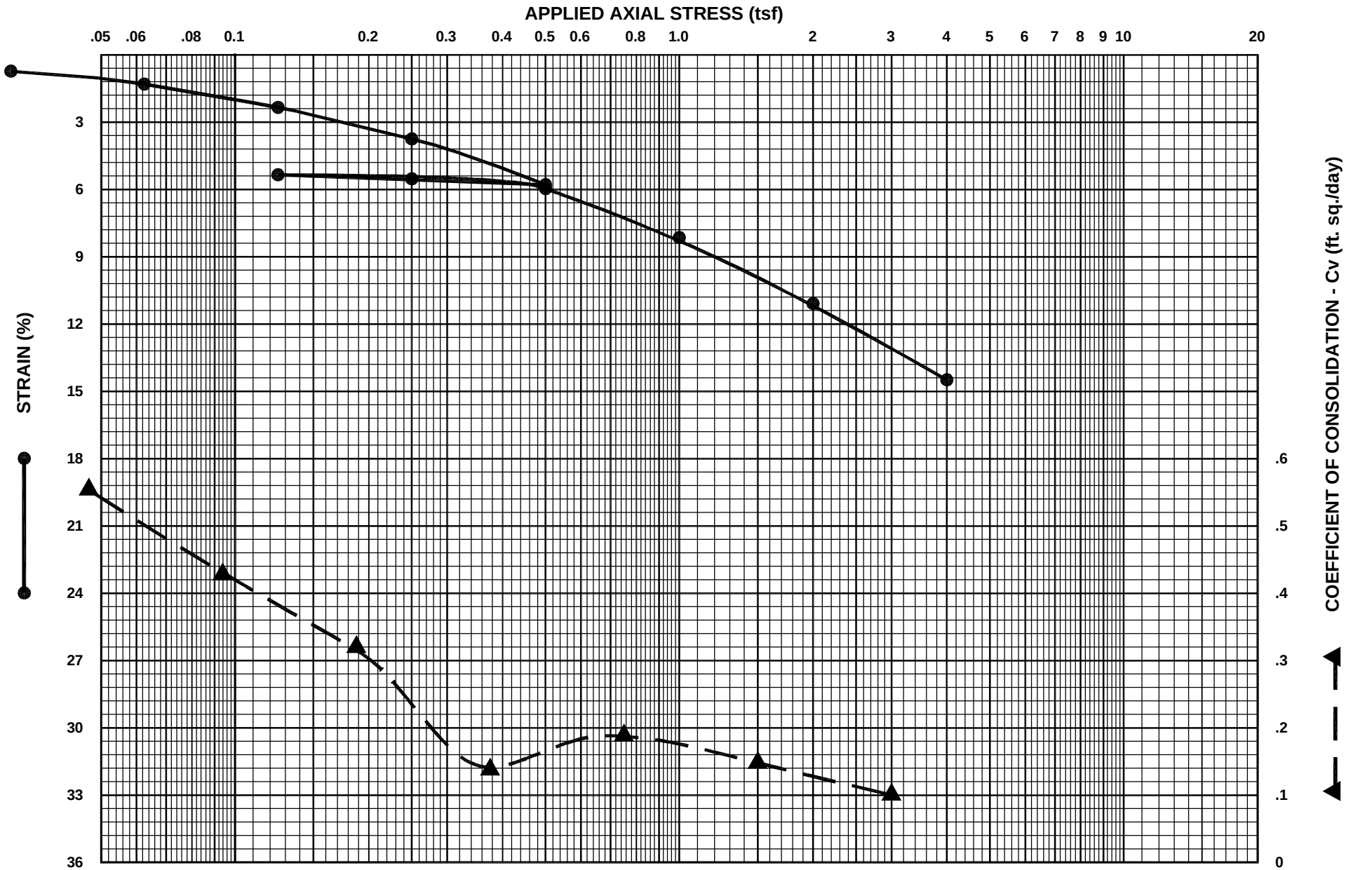
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	167.7	LL = 92
INITIAL DRY DENSITY (lbs./cu.ft.) =	28.8	PL = 30
FINAL MOISTURE CONTENT (%) =	93.1	PI = 62

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

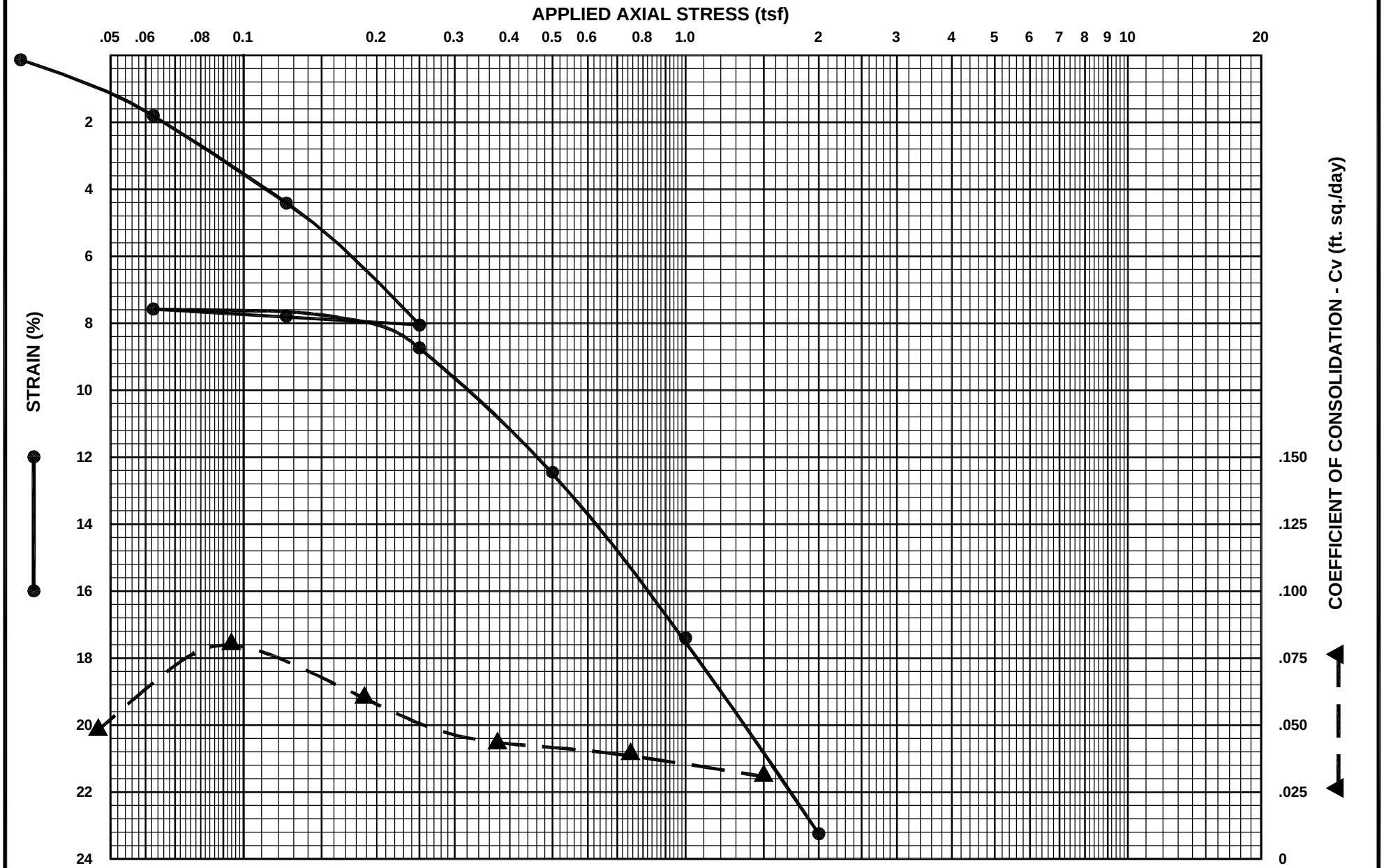
BORING NO.: B-7
DEPTH (feet): 4-6
MATERIAL: Gray ORGANIC CLAY w/silty sand seams
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	46.1	LL = 54
INITIAL DRY DENSITY (lbs./cu.ft.) =	71.2	PL = 21
FINAL MOISTURE CONTENT (%) =	39.2	PI = 33

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-8
DEPTH (feet): 4-6
MATERIAL: Gray ORGANIC CLAY

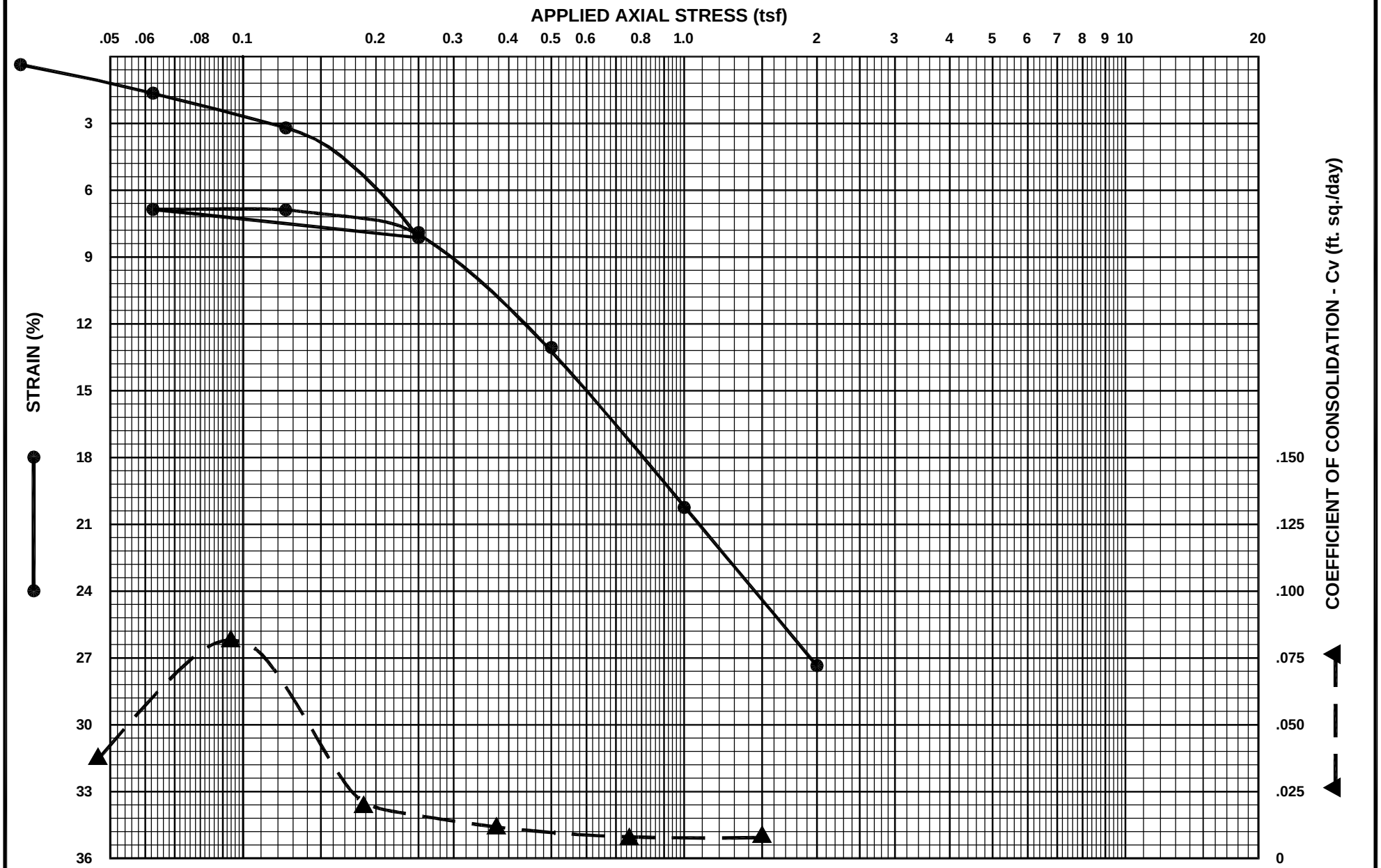
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	**57.5**	**LL = 30**
INITIAL DRY DENSITY (lbs./cu.ft.) =	**63.1**	**PL = 21**
FINAL MOISTURE CONTENT (%) =	**43.7**	**PI = 9**

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

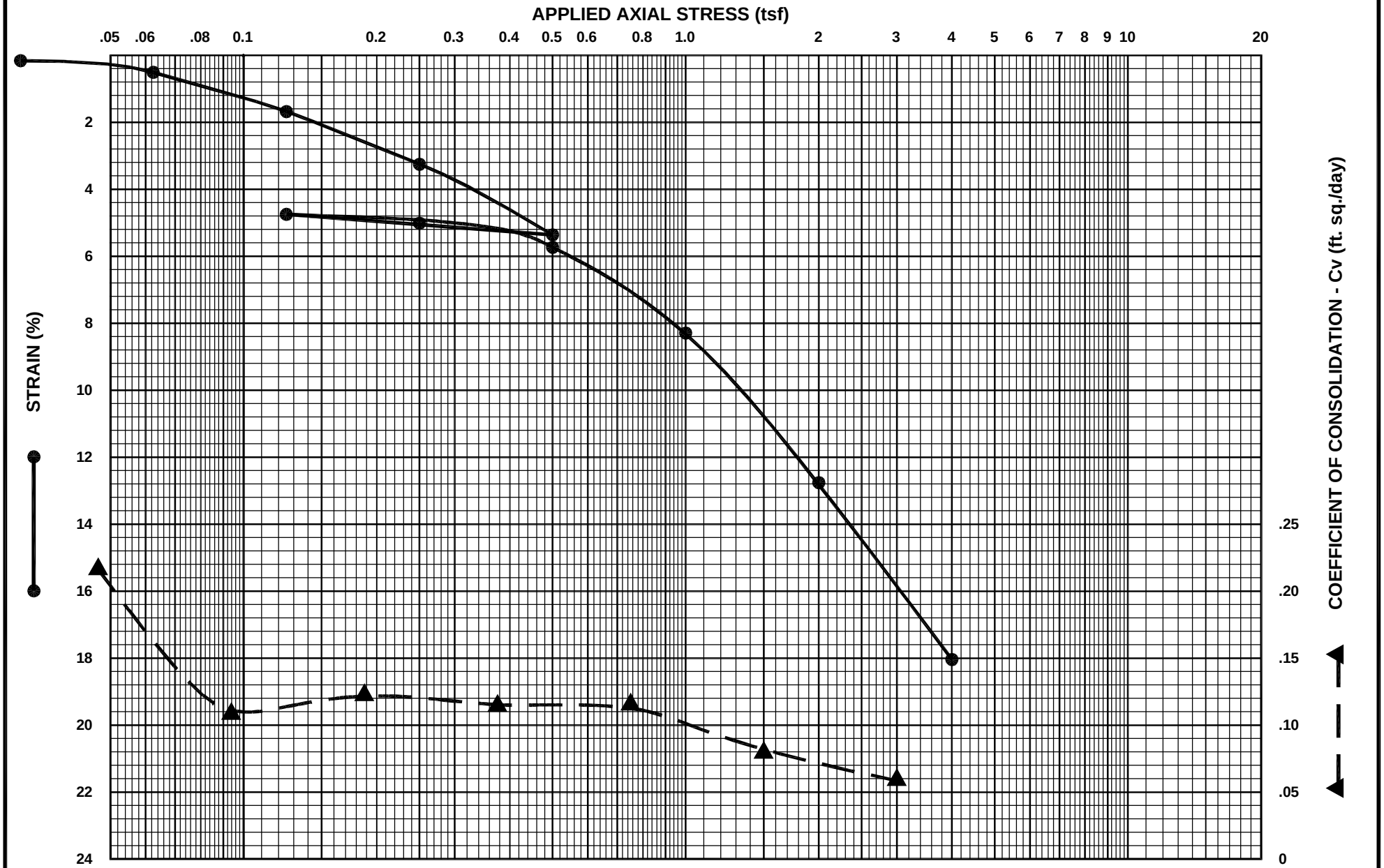
BORING NO.: B-8
DEPTH (feet): 13-15
MATERIAL: Gray ORGANIC CLAY w/peat seams
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	98.3	LL = 99
INITIAL DRY DENSITY (lbs./cu.ft.) =	45.2	PL = 30
FINAL MOISTURE CONTENT (%) =	59.5	PI = 69

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

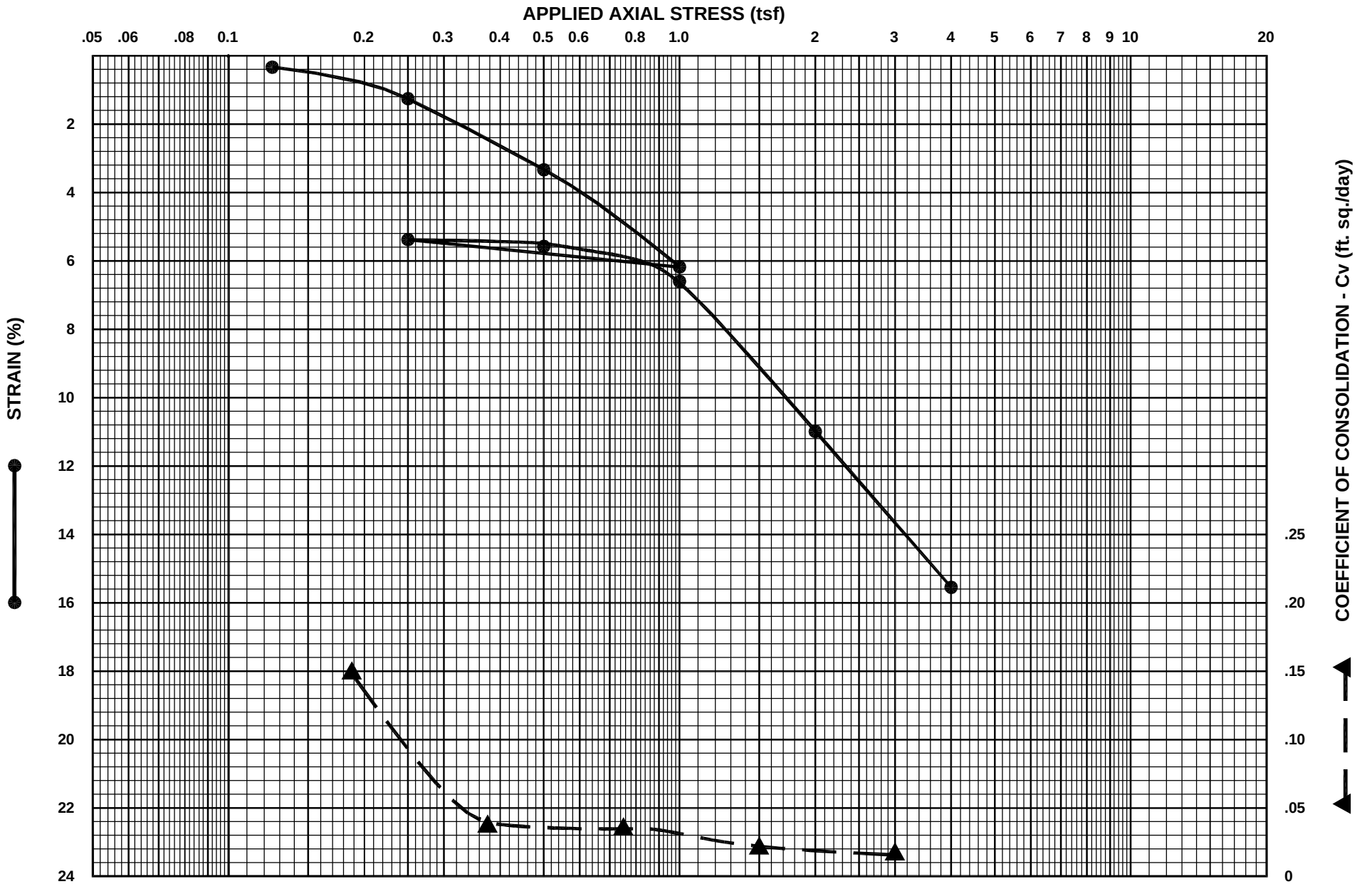
BORING NO.: B-8
DEPTH (feet): 38-40
MATERIAL: Gray SILTY CLAY w/silty sand lenses & layers
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	39.2	LL = 46
INITIAL DRY DENSITY (lbs./cu.ft.) =	76.0	PL = 19
FINAL MOISTURE CONTENT (%) =	35.4	PI = 27

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-9
DEPTH (feet): 6-8
MATERIAL: Light gray ORGANIC CLAY

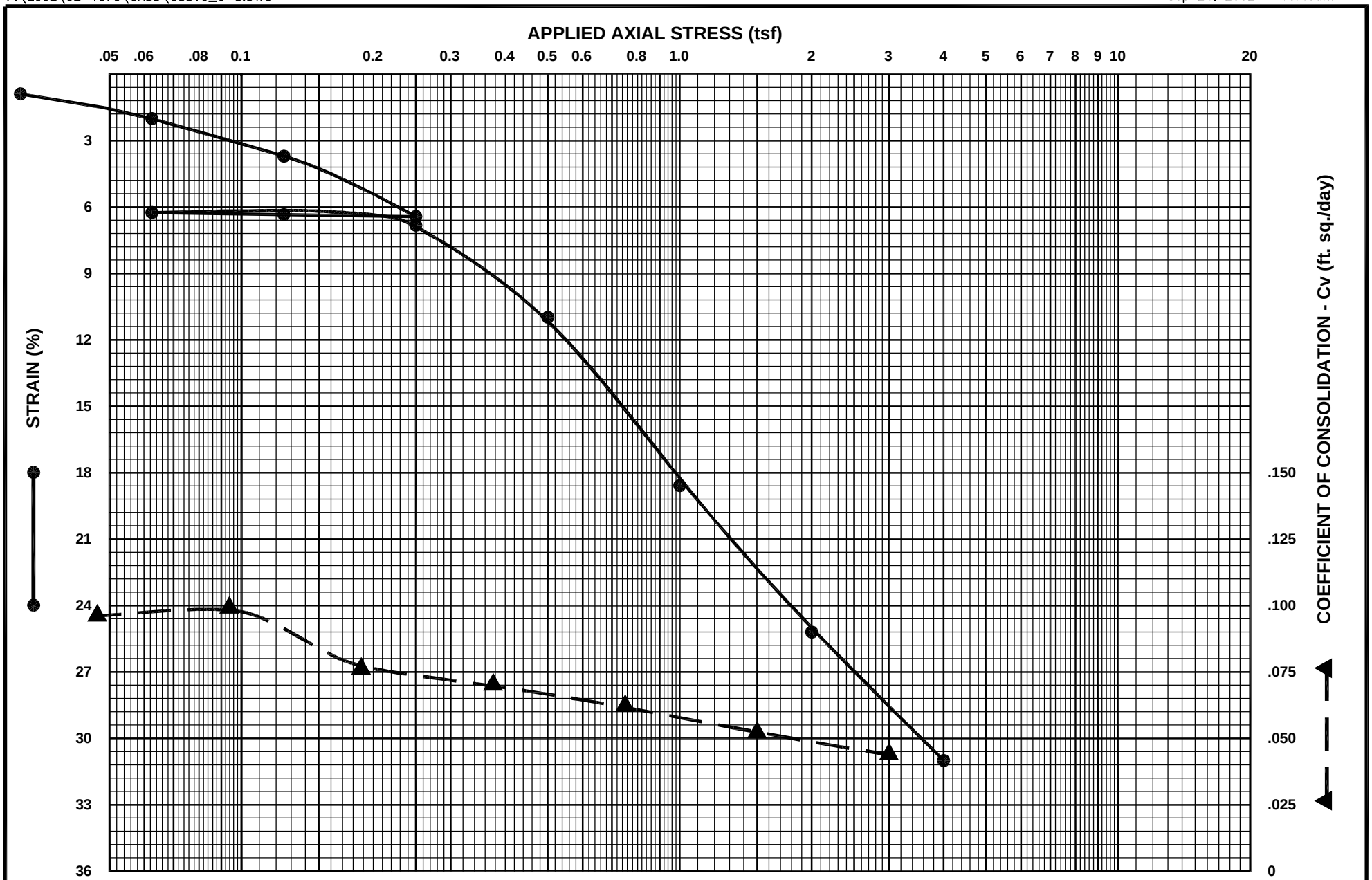
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	142	LL = 48
INITIAL DRY DENSITY (lbs./cu.ft.) =	45.3	PL = 20
FINAL MOISTURE CONTENT (%) =	32.7	PI = 28

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

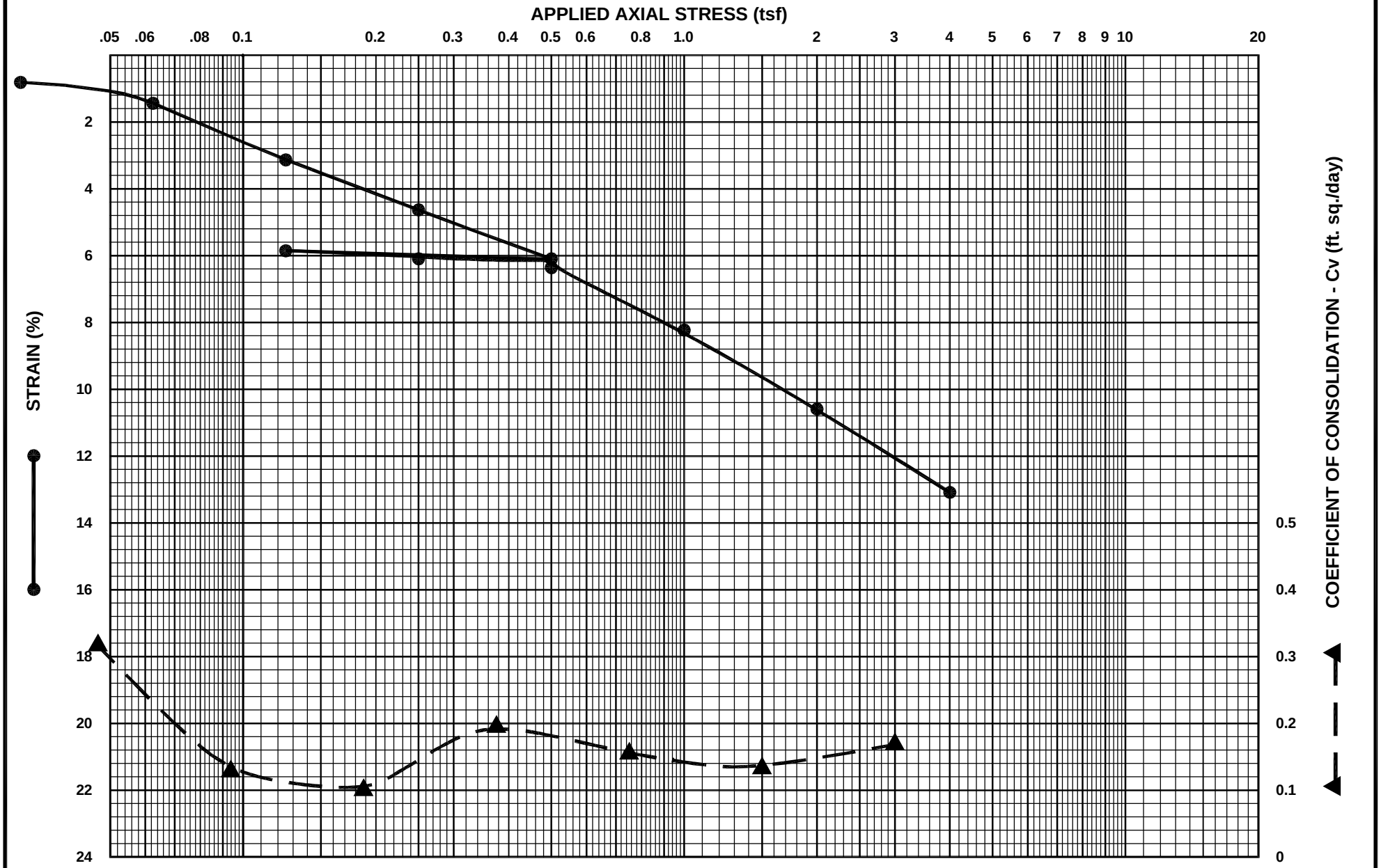
BORING NO.: B-10
DEPTH (feet): 6-8
MATERIAL: Gray ORGANIC CLAY w/sand seams
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	64.0	LL = 64
INITIAL DRY DENSITY (lbs./cu.ft.) =	59.3	PL = 25
FINAL MOISTURE CONTENT (%) =	41.4	PI = 39

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

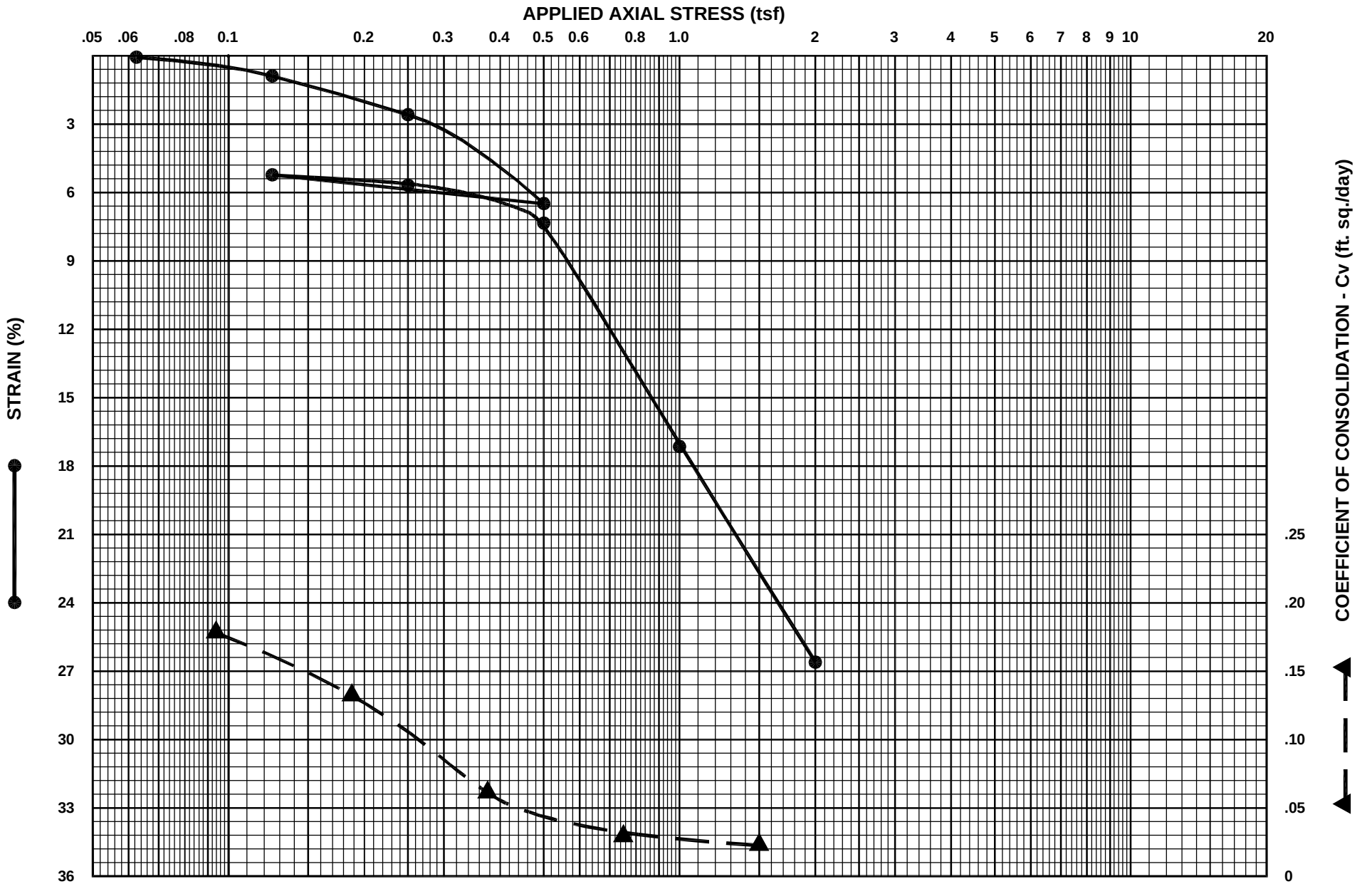
BORING NO.: B-12
DEPTH (feet): 4-6
MATERIAL: Gray SILTY CLAY w/silty sand seams
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	38.6	LL = 34
INITIAL DRY DENSITY (lbs./cu.ft.) =	79.7	PL = 26
FINAL MOISTURE CONTENT (%) =	29.1	PI = 8

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-15
DEPTH (feet): 6-8
MATERIAL: Gray ORGANIC CLAY

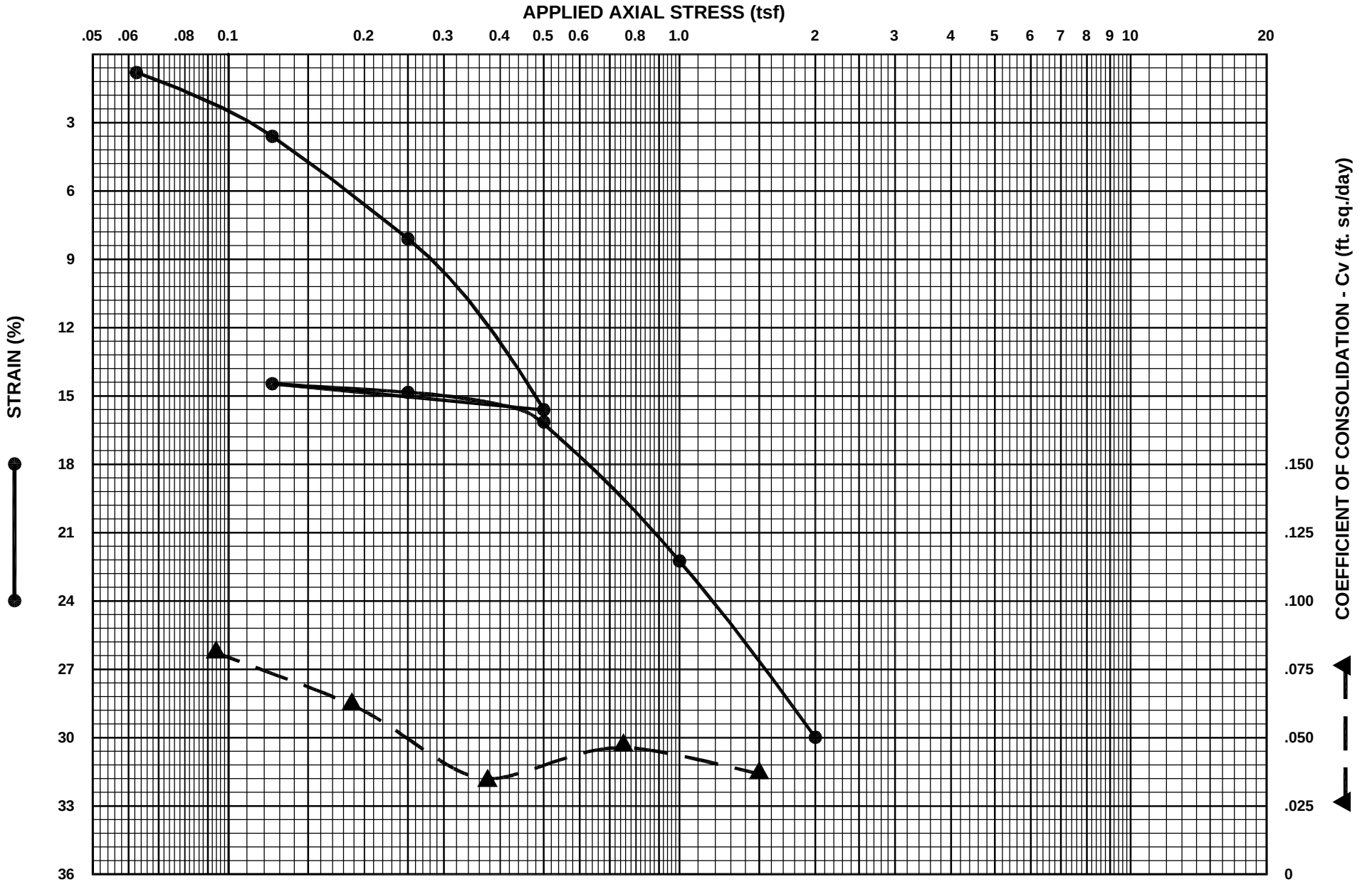
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	79.3	LL = 45
INITIAL DRY DENSITY (lbs./cu.ft.) =	51.4	PL = 21
FINAL MOISTURE CONTENT (%) =	56.1	PI = 24

FIGURE NO.:



CONSOLIDATION TEST

SAMPLE IDENTIFICATION

BORING NO.: B-17
DEPTH (feet): 6-8
MATERIAL: Gray ORGANIC CLAY w/silty sand pockets
FILE NO.: 02-1073

STE
Soil Testing Engineers, Inc.

CLASSIFICATION DATA

INITIAL MOISTURE CONTENT (%) =	78.6	LL = 101
INITIAL DRY DENSITY (lbs./cu.ft.) =	51	PL = 34
FINAL MOISTURE CONTENT (%) =	49.8	PI = 67

FIGURE NO.: